

# **American Society for Engineering Education Annual Conference and Exposition 2014**

**Indianapolis, Indiana, USA  
15-18 June 2014**

**Volume 1 of 22**

ISBN: 978-1-63439-085-9

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2014) by the American Society for Engineering Education  
All rights reserved.

Printed by Curran Associates, Inc. (2014)

For permission requests, please contact American Society for Engineering Education  
at the address below.

American Society for Engineering Education  
1818 N Street, N.W., Suite 600  
Washington, DC 20036-2479

Phone: (202) 331-3500  
Fax: (202) 265-8504

[www.asee.org](http://www.asee.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## VOLUME 1

### M116 – DATA ANALYTICS IN EDUCATION

<b>9508 - Using Natural Language Processing Tools to Classify Student Responses to Open-Ended Engineering Problems in Large Classes</b> .....	1
<i>M. Verleger</i>	
<b>10292 - Social Motif Analytics: Network Building Blocks for Assessing Participation in an Online Engineering Community</b> .....	16
<i>H. Teo</i>	
<b>10058 - Mining Student-Generated Textual Data In MOOCS And Quantifying Their Effects on Student Performance and Learning Outcomes</b> .....	26
<i>C. Tucker, B. Pursel</i>	
<b>9171 - Self-Assessment of Learning Using Intelligent Interactive Worksheets</b> .....	40
<i>H. Peterson, K. Shryock</i>	

### M117 – INFORMATION AND NETWORK SECURITY

<b>8420 - Security Incident Tracking in Virtualized Linux Environment</b> .....	53
<i>M. Tu, S. Xue</i>	
<b>10526 - Curriculum Development for Embedded Systems Security</b> .....	66
<i>J. Zalewski, A. Kornecki, B. Czejdo, F. Gonzalez, N. Subramanian, D. Trawczynski</i>	
<b>10261 - Are We Prepared: Issues Relating to Cyber Security Economics</b> .....	76
<i>J. Leclair, D. Pheils</i>	
<b>8523 - The Effect of Feedback Mechanisms on Students' Learning in the Use of Simulation-based IT Training in a Computer Networking Program</b> .....	88
<i>U. Ghani, A. Khan</i>	
<b>10757 - A Longitudinal Study of Students in an Introductory Cybersecurity Course</b> .....	105
<i>R. Bell, E. Vasserman, E. Sayre</i>	

### M118 – CONSTRUCTION SAFETY AND RISK MANAGEMENT

<b>10568 - Fatal Fall Accidents in Small Building Construction Projects</b> .....	116
<i>Y. Hatipkarasulu, H. Pierce, S. Gunhan, R. Liu</i>	
<b>8623 - Extent of Construction Safety in the Engineering Curricula from the Perspective of Practitioners in the MENA Region</b> .....	126
<i>E. Zanelidin, A. Sweedan, M. Maraqa</i>	
<b>10462 - Controlling Workers' Compensation Costs In Construction</b> .....	138
<i>N. Opfer, D. Shields</i>	
<b>9287 - Interactive Probabilistic Risk Analysis for Construction Engineering and Management</b> .....	151
<i>J. Du, Y. Hatipkarasulu, R. Liu</i>	

### M120 – COOPERATIVE & EXPERIENTIAL EDUCATION DIVISION TECHNICAL SESSION 1

<b>10333 - Engineering Students' Experiences of Workplace Problem Solving</b> .....	163
<i>R. Pan, J. Strobel</i>	
<b>9273 - Introduction to Cooperative Education-The Course</b> .....	185
<i>J. Watson, M. Schomaker</i>	
<b>9961 - A Model for Engineering Ethics Education through a Co-op Program</b> .....	195
<i>C. Plouff, N. Barakat</i>	
<b>9281 - Enrichment Activities in Support of a Student Integrated Intern Research Experience</b> .....	207
<i>M. Rossetti, K. Needy, E. Clausen, C. Gattis, M. Hale</i>	

### M125B – INNOVATIVE USE OF TECHNOLOGY AND THE INTERNET IN ENGINEERING EDUCATION

<b>8510 - The Potential for Computer Tutors to Assist Students Learning to Solve Complex Problems</b> .....	217
<i>P. Steif, L. Fu</i>	
<b>8663 - Engineering Vocabulary Development using an Automated Software Tool</b> .....	237
<i>C. Varlaw, S. McCahan</i>	
<b>9945 - A Preliminary Summative Assessment of the HigherEd 2.0 Program--Using Social Media in Engineering Education</b> .....	250
<i>E. Berger, E. Pan, A. Orange, W. Heinecke</i>	
<b>8813 - Online Homework: Does it Help Or Hurt in the Long Run?</b> .....	265
<i>J. Davis, T. McDonald</i>	

9765 - Mediators of Participation in Online Discussions .....	271
<i>E. Shaw, J. Kim, J. Yoo</i>	

### **M127 – RENEWABLE ENERGY IN CLASSROOM**

8622 - Significant Learning in Renewable Energy .....	282
<i>T. Marbach</i>	
9641 - Laboratory Emulation of Wind Turbine Operations .....	293
<i>M. Yilmaz, N. Dhansri</i>	
9028 - Developing a Renewable Energy Technology Course for a Master of Technology (MTECH) Program .....	305
<i>O. Momoh</i>	
10201 - Integrated Multisource Renewable Energy System Design: A Student Project .....	315
<i>H. Hess, B. Johnson, R. Jain, A. Dahal</i>	
8779 - Teaching Renewable Energy System Design and Analysis with HOMER .....	324
<i>R. Belu, R. Chiou, K. Ghaisas, T.-L. Tseng</i>	

### **M131 – INNOVATIONS IN TEACHING ECONOMY**

8416 - "Engineering Economics Jeopardy!" Mobile App Development Process and Student Satisfaction .....	337
<i>W. Zhu, A. Marquez, J. Yoo</i>	
8658 - Teaching Time Value of Money: A Few Winning Strategies from the Front Lines .....	350
<i>G. Nicholls, N. Lewis, T. Eschenbach</i>	
10157 - The Use of Videos as a Tool to Reinforce Engineering Economy Course Topics: Lessons Learned .....	364
<i>B. Gray, G. Fragoso-Diaz, E. Jones</i>	
8513 - Relationship of Final Grade and Use of On Line Course Materials for an Engineering Economics Course .....	371
<i>P. Kauffmann, J. Wilck Iv</i>	

### **M132 – UNDERSTANDING OUR STUDENTS & ETHICAL DEVELOPMENT**

8883 - Ethical Reasoning Development in Project-based Learning .....	386
<i>E. McBride-Pluskwik, P. Hamari</i>	
9395 - Ethics for the "Me" Generation - How "Millennial" Engineering Students View Ethical Responsibility in the Engineering Profession .....	398
<i>N. Tyne, M. Brunhart-Lupo</i>	
10542 - How Engineering Students view Dilemmas of Macroethics: Links between Depth of Knowledge and Ethical Literacy .....	408
<i>D. Wilson, M. Kim, R. Bates, E. Burpee</i>	

### **M134 – ENTREPRENEURSHIP & ENGINEERING INNOVATION DIVISION NEW IDEAS SESSION 1**

8942 - An Experiential Learning Approach to Develop Leadership Competencies in Engineering and Technology Students .....	429
<i>G. Warnick, J. Schmidt, A. Bowden</i>	
10204 - Assessing the Effectiveness of Leadership Education for Engineering Students .....	443
<i>D. Bayless</i>	
9682 - From Faculty to Change Agent: Lessons Learned in the Development and Implementation of a Change Workshop .....	453
<i>E. Ingram, R. House, S. Chenoweth, K. Dee, J. Ahmed, J. Williams, C. Downing, D. Richards</i>	
10257 - Problem Framing as a Teachable Skill: A Practical Approach to Teaching Leadership Communication .....	465
<i>K. Neeley</i>	
9181 - A Method for Assessing Engineering Leadership Content in the Engineering Curriculum: A First Look at Civil Engineering Project Management Courses .....	471
<i>R. Schuhmann, J. Magarian, E. Huttner-Loan</i>	

### **M140 – ENTREPRENEURSHIP & ENGINEERING INNOVATION DIVISION NEW IDEAS SESSION 1**

9342 - Fostering Intra- and Entrepreneurship in Engineering Students .....	482
<i>E. Jablonski</i>	
9911 - The UT TRANSFORM Project .....	493
<i>D. Novick, C. Hallam, D. Gilbert, O. Wenker, G. Frankwick</i>	
9914 - The Innovation Canvas: An Instructor's Guide .....	502
<i>J. Ahmed, R. Rogge, W. Kline, R. Bunch, T. Mason, M. Wollowski, G. Livesay</i>	
9349 - Case-Based Instruction for Innovation Education in Engineering and Technology .....	514
<i>C. Bozic, N. Hartman</i>	
10312 - Mobile App Development: A Cross-Discipline Team-Based Approach to Student and Faculty Learning .....	527
<i>S. Kulkarni, F. Klassner, V. Gehlot, E. Dougherty III, S. Metzger, W. Wagner</i>	

9305 - Leveraging MOOCs to Bring Entrepreneurship and Innovation to Everyone on Campus.....	541
<i>J. Green, A. Sherman</i>	

**M142 – FPD 1: THE PATH TO ENGINEERING**

10223 - Pre-College Engineering Participation Among First-Year Engineering Students .....	553
<i>N. Salzman, G. Ricco, M. Ohland</i>	
9596 - Consistency in Assessment of Pre-Engineering Skills .....	561
<i>S. Lorimer, J. Davis</i>	
9742 - Distinctive Academic Programs as a School Choice Factor: An Exploratory Study .....	575
<i>L. Rynearson</i>	
9246 - The Accidental Engineer .....	583
<i>C. Brawner, M. Orr, M. Ohland</i>	

**M143 – DISCIPLINE SPECIFIC TOPICS AND TECHNIQUES**

8853 - The Mentoring Experience: Finding Value in Guiding Undergraduate Researchers .....	597
<i>K. Luchini-Colbry, K. Wawrzynski, M. Shannahan</i>	
10717 - Impact of a Graduate Elective in Microbial Soft Matter on Interdisciplinary Learning .....	610
<i>E. Stewart, J. Younger, M. Solomon</i>	
10779 - Snapshot of an Interdisciplinary Graduate Engineering Education Experience .....	624
<i>T. Zephirin, C. Berdanier, M. Cox, S. Black</i>	
10849 - Preliminary Analyses of Survey and Student Outcome Data using the Global Real-Time Tool for Teaching Enhancement (G-RATE) .....	638
<i>N. Sambamurthy, M. Cox, Y. Maeda, K. Perram, V. Alexander</i>	

**M147 – K 12 AND PRECOLLEGE ENGINEERING CURRICULUM AND PROGRAMMING RESOURCES, PART 1 OF 2**

10450 - Roads, Rails and Race Cars: a STEM Educational Program for 4th-12th Grade Students .....	644
<i>C. Baker, L. Rilett, G. Kunz, G. Nugent</i>	
10577 - Using Fluid Power Workshops to Increase STEM Interest in K-12 Students .....	657
<i>J. Garcia, Y. Kuleshov, J. Lumkes</i>	
9051 - Building Engineering Interest and Sandcastles through Collaborative Instructional Design .....	669
<i>P. Brady, J. Guthrie</i>	
10686 - Teaching Energy Concepts using Chain Reaction Machines .....	680
<i>S. McCall, R. Taylor, O. Dalrymple, S. Jordan</i>	

**M148 – CRITICAL THINKING, LEADERSHIP, AND CREATIVITY**

9010 - New Metaphors for New Understandings: Ontological Questions about Developing Grounded Theories in Engineering Education .....	690
<i>K. Beddoes, C. Schimpf, A. Pawley</i>	
9397 - Billy Vaughn Koen and the Personalized System of Instruction in Engineering Education .....	703
<i>A. Aker</i>	
9725 - Practicing Engineers' Perceptions of Empathy and Care: Derived Exploratory Factor Structure from a 37-Item Survey .....	719
<i>J. Hess, J. Strobel, R. Pan, C. Morris</i>	
9931 - Living With Contradiction: Cultural Historical Activity Theory as a Theoretical Frame to Study Student Engineering Project Teams .....	734
<i>M. Jones</i>	

**M152 – NEW TEACHING PEDAGOGIES: METHODS AND ASSESSMENTS**

8918 - Using a “Flipped Classroom” Model in Undergraduate Newtonian Dynamics .....	749
<i>S. Swithenbank, T. Denucci</i>	
9762 - Comparison of Student Performance and Perceptions Across Multiple Course Delivery Modes .....	760
<i>M. Cavalli, J. Neubert, D. McNally, D. Jacklitch-Kuiken</i>	
9006 - The Purdue Mechanics Freeform Classroom: A New Approach to Engineering Mechanics Education .....	770
<i>J. Rhoads, E. Nauman, B. Holloway, C. Krousgrill</i>	
9090 - A Pilot Study of an Online Accelerated Statics Course with Intensive Video Delivery .....	785
<i>B. Caldwell, C. Halupa</i>	

**M154 – SUMMER AND COHORT PROGRAMS FOR MINORITY: STUDENT SUCCESS**

9336 - S-STEM: ENG2 Scholars for Success 2007-2013 ..... 798  
*S. Jones, K. Rusch, W. Waggenpack Jr.*

9001 - Emerging Impact on Graduation Rates/Times From A Summer Engineering Enrichment Program ..... 826  
*R. Whalin, Q. Pang*

9763 - Examining the Transition To Engineering: A Multi-Case Study of Six Diverse Summer Bridge Program  
Participants ..... 837  
*W. Lee, C. Seimetz, C. Amelink*

10977 - Can an Engineering Summer Bridge Program Effectively Transition Underrepresented Minority Students  
Leading to Increased Student Success?..... 853  
*D. Dickerson, F. Solis, V. Womack, T. Zephirin, C. Stwalley*

9183 - Lessons Learned in Establishing Stem Student Cohorts at a Border University and the Effect on Student  
Retention and Success ..... 863  
*M. Bouniaev, I. Edinbarough, B. Elliot*

**VOLUME 2**

**M156 – CLASSROOM MANAGEMENT**

10850 - Best Practices in Classroom Management for Today's University Environment..... 874  
*J. Ladeji-Oslas, A. Wells*

9775 - Second-Year Enhancements to a Summer Faculty Immersion Program ..... 884  
*J. Morales, M. Prince*

9847 - Subscribing to WII-FM: When will we Begin to Function as a Team? ..... 903  
*A. Jackson, S. Jackson*

8601 - On the Role of the Professor in Creating a Positive Learning Environment ..... 915  
*W. Akili*

9816 - Optimizing Your Teaching Load..... 930  
*E. Gehringer*

9004 - Be the Leader of Your Class: Applying Leadership Behaviors to Manage Student Conduct and  
Performance ..... 946  
*R. Ocon*

**M158 – NUCLEAR AND RADIOLOGICAL DIVISION TECHNICAL SESSION 1**

10375 - Developing a Minor Program in Nuclear Science and Engineering..... 966  
*M. Naghedolfeizi, S. Arora, N. Yousif*

8677 - Developing a Reactor Operator Training Course Series at Oregon State University..... 973  
*W. Marcum, S. Reese, R. Schickler*

10874 - Multi-Disciplinary Teams and Collaborative Peer Learning in an Introductory Nuclear Engineering  
Course ..... 981  
*S. Helder, B. Sones, B. Moretti*

10795 - Support for Interdisciplinary Engineering Education Through Application of Industry-Focused Case  
Studies..... 990  
*T. McLaughlin*

10898 - The Effects of Interdisciplinary Collaboration in Completing a Radiological Engineering Design Project ..... 997  
*N. Echeverria, K. Allen*

**M170 – GAINFUL EMPLOYMENT: PREPARING TECHNICIAN TO SATISFY THE NEEDS OF INDUSTRY**

10454 - Curriculum Design and Assessment to Address the Industry Skills Gap..... 1007  
*D. Spang*

10390 - Career Pathways for STEM Technicians ..... 1021  
*D. Hull, G. Kepner*

10560 - Systems Technicians: Electronics Foundation With Photonics, Robotics and Other Specialties ..... 1033  
*D. Hull, C. Panaylotou*

9104 - Master of Science Degree in Industrial management Designed for Technical College Instructors in  
Engineering and Technology ..... 1042  
*F. Heidari*

9817 - The Internet of Things (IoT) Will Create the Need for the Cyber-Physical System Technician ..... 1052  
*G. Mullett*

## **M357 – NSF GRANTEE’S POSTER SESSION**

<b>10784 - A Case Study: How Collaborative PBL Affects Learning of Minority Students in Engineering Courses at Senior Level</b> .....	1062
<i>J. Dong, P. Chen</i>	
<b>8668 - A Classification Scheme for “Introduction to Engineering” Courses: Defining First-Year Courses Based on Descriptions, Outcomes and Assessment</b> .....	1072
<i>K. Reid, D. Reeping</i>	
<b>9115 - A Comparative Study of Engineering Matriculation Practices</b> .....	1083
<i>M. Ohland, C. Brawner, X. Chen, M. Orr</i>	
<b>10505 - A Flat Learning Environment - Learning To Solve Ill-Structured Problems</b> .....	1090
<i>Z. Siddique, F. Akasheh, G. Kremer</i>	
<b>9437 - A Platform for Computer Engineering Education</b> .....	1104
<i>S. Sohoni, K. Kearney, R. Damron</i>	
<b>10689 - A Preliminary Analysis of the Impact of Geotechnical Concept Tools (GCT) Integrated into a Civil Engineering Classroom</b> .....	1118
<i>K. Warren, C. Wang</i>	
<b>9062 - A Realistic Intelligent Multimedia Virtual Laboratory for Power Engineering</b> .....	1138
<i>N. Gong, B. Butz, L. Bai, S. Biswas</i>	
<b>8982 - A Summer Program to promote an Integrated Undergraduate Research and Group Design Experience</b> .....	1152
<i>C. Shih, W. Oates</i>	
<b>8892 - A Systems-Centric, Foundational Experience in Circuits</b> .....	1164
<i>T. Weller, C. Haden, J. Frolik, P. Flikkema, A. Ohta, S. Thomas, R. Franklin, W. Shiroma</i>	
<b>8866 - Access to Cooperative Education Programs and the Academic and Employment Returns by Race, Gender, and Discipline</b> .....	1179
<i>J. Main, M. Ohland, N. Ramirez, T. Fletcher</i>	
<b>8567 - Active Analog Circuit Design: Laboratory Project and Assessment</b> .....	1185
<i>R. Ramachandran, K. Dahm, R. Kozick, R. Nickel, S. Shetty, R. Polikar, Y. Tang, S. Chin</i>	
<b>8998 - An Examination of the Effects of Contextual Computer-aided Design Exercises on Student Modeling Performance</b> .....	1199
<i>M. Johnson, X. Peng, B. Yalvac, E. Ozturk, K. Liu</i>	
<b>10226 - An Inclusive Process for Developing a Taxonomy of Keywords for Engineering Education Research</b> .....	1212
<i>C. Finelli, M. Borrego</i>	
<b>10202 - An Interactive Steel Connection Teaching Tool - A Virtual Structure</b> .....	1219
<i>S. Moaveni, K. Chou</i>	
<b>8492 - Analysis of the Impact of Participation in a Summer Bridge Program on Mathematics Course Performance by First-Semester Engineering Students</b> .....	1237
<i>J. Reisel, M. Jablonski, A. Kialashaki, E. Dupe, H. Hosseini</i>	
<b>9042 - Are Multiple-Choice Questions Suitable for a Final Examination in a STEM Course?</b> .....	1251
<i>G. Aden-Buie, A. Kaw, A. Yalcin, R. Pendyala</i>	
<b>9967 - Assessing Sustainability Knowledge: a Framework of Concepts</b> .....	1264
<i>A. Pawley, S. Hoffmann, M. Cardella, M. Ohland, R. Rao, A. Jahiel, T. Seager, L. Vanasupa</i>	
<b>9439 - Assessment of Active Learning Modules: An Update in Research Findings</b> .....	1283
<i>A. Brown, K. Watson, J. Liu, I. Orabi, J. Rencis, C.-C. Chen, F. Akasheh, J. Wood, K. Jackson, R. Hackett, E. Sargent, B. Dunlap, C. Wejmar, R. Cravford, D. Jensen</i>	
<b>8971 - Assessment of Product Archaeology as a Framework for Contextualizing Engineering Design</b> .....	1314
<i>K. Lewis, D. Moore-Russo, A. McKenna, P. Cormier, A. Johnson, A. Carberry, W. Chen, D. Gatchell, T. Simpson, C. Tucker, G. Kremer, S. Zappe, S. Shooter, C. Kim, C. Williams, L. McNair, M. Paretto, J. Tranquillo</i>	
<b>9974 - Building a Student-Generated Instructional Video Library for Thermodynamics</b> .....	1332
<i>J. Abulencia, D. Silverstein, M. Vigeant</i>	
<b>8885 - Building Assessment and Evaluation Capacity of Engineering Educators Through ASSESS</b> .....	1339
<i>J. Lebeau, D. Davis, N. Schroeder, B. French, S. Brown, H. Davis</i>	
<b>8706 - Building Capacity for Preparing Teacher-Engineers for 21st Century Engineering</b> .....	1356
<i>E. Villa, P. Golding</i>	
<b>9564 - CAREER: A Study of How Engineering Students Approach Innovation</b> .....	1361
<i>S. Purzer, N. Fila, P. Mathis</i>	
<b>10172 - CAREER: Mathematics as a Gatekeeper to Engineering: The Interplay between Mathematical Thinking and Design Thinking - Using Video Data</b> .....	1367
<i>D. Tolbert, M. Cardella</i>	
<b>9338 - CAREER: Student Motivation and Learning in Engineering</b> .....	1381
<i>L. Benson, A. Kirn, C. Faber</i>	
<b>9116 - Characterizing and Modeling the experience of Transfer Students in Engineering</b> .....	1390
<i>M. Ohland, C. Brawner, C. Mobley, R. Layton, R. Long, C. Cosentino, M. Sullivan</i>	
<b>9217 - Cloud Computing for Education: A Professional Development Program for High School Teachers</b> .....	1397
<i>R. Curtmola, J. Carpinelli, L. Hirsch, H. Kimmel, L. Burr-Alexander</i>	
<b>9861 - Collaborative Research: Center for Mobile Hands-On STEM</b> .....	1415
<i>K. Connor, K. Meehan, D. Newman, D. Walter, B. Ferri, Y. Astatke, M. Chouikha</i>	
<b>8772 - Collaborative Research: Gender Diversity, Identity and EWB-USA</b> .....	1421
<i>K. Litchfield, A. Javernick-Will, C. Leslie</i>	

<b>9372 - Collaborative Research: Identifying and Assessing Key Factors of Engineering Innovativeness</b> .....	1429
<i>S. Purzer, K. Jablow, D. Ferguson, M. Ohland, J. Menold</i>	
<b>9061 - Collaborative Research: Integration of Conceptual Learning throughout the Core Chemical Engineering Curriculum - Year 3</b> .....	1438
<i>M. Koretsky, J. Falconer, D. Silverstein, B. Brooks, D. Gilbuena, C. Smith</i>	
<b>9926 - Conceptual Change Across Engineering Disciplines</b> .....	1446
<i>R. Streveler, D. Montfort, G. Herman, S. Brown, H. Matusovich</i>	
<b>9153 - Control Strategy for a Benchtop Hybrid Powertrain</b> .....	1455
<i>E. Constans, M. Acosta, J. Kadlowec, B. Angelone</i>	
<b>10792 - Correlating Experience and Performance of On-Campus and On-Line Students Assisted by Computer Courseware: a Case Study</b> .....	1464
<i>H. Man</i>	
<b>9177 - Creating an Infrastructure Education Community of Practice</b> .....	1466
<i>P. Parker, C. Haden, S. Hart, M. Thompson, M. Roberts</i>	
<b>9994 - Design for Impact: Reimagining Inquiry-Based Activities for Effectiveness and Ease of Faculty Adoption</b> .....	1473
<i>M. Vigeant, M. Prince, K. Nottis, M. Koretsky</i>	
<b>8959 - Design Heuristics: An Evidence-Based tool to Improve Innovation</b> .....	1477
<i>S. Yilmaz, S. Daly, C. Seifert</i>	
<b>10426 - Design Projects to Quantify the Health and Development of Autistic Children</b> .....	1492
<i>S. Warren, P. Prakash, E. Brokesh, G. Singleton</i>	
<b>8937 - Developing a Photonics and Laser Technician Education and Training Program</b> .....	1511
<i>A. Sala</i>	
<b>10154 - Developing Critical Thinking Skills in a Mixed-Signal Test and Product Engineering Course</b> .....	1520
<i>T. Hudson, S. Sipes</i>	
<b>9411 - Development and Implementation of Interactive Virtual Laboratories to Help Students Learn Threshold Concepts in Thermodynamics - Year 1</b> .....	1530
<i>M. Koretsky</i>	
<b>10330 - Development of Agent-based Tutor &amp; Simulator System and Assessment of Instructional Modules Implemented in areas of Quality Control, Metrology and Prototyping</b> .....	1543
<i>I. Husanu, Y. Ertekin, R. Belu</i>	
<b>9918 - Development of an Integrated Curriculum for Educating Engineers about Nanotechnology: End-of-Life Management of Nanomaterial-Containing Wastes</b> .....	1557
<i>C. Pierce, N. Berge</i>	
<b>8508 - Digital Technology Education Collaborative First Year Progress Report</b> .....	1565
<i>N. Alarje, A. Sergeyev, C. Kief, B. Matar</i>	
<b>8911 - Dissemination of Microprocessor Courses through Classroom and Interactive Cyber-Enabled Technologies</b> .....	1575
<i>S. Hsiung, J. Ritz, E. Yaprak, T. Stout, R. Jones</i>	
<b>8793 - Effective Course Redesign Strategies to Integrate Collaborative PBL in Senior Computer Engineering/Computer Science Courses</b> .....	1584
<i>J. Dong, H. Guo</i>	
<b>10074 - Effectively Engaging Engineers in Ethical Reasoning About Emerging Technologies: a Cyber-enabled Framework of Scaffolded, Integrated, and Reflexive Analysis of Cases</b> .....	1598
<i>L. Kisselburgh, C. Zoltowski, J. Beever, J. Hess, A. Iliadis, A. Brightman</i>	
<b>8596 - Effectiveness of Green-BIM Teaching Method in Construction Education Curriculum</b> .....	1615
<i>J.-L. Kim</i>	
<b>8985 - Emerging Themes in a Distance-Delivered Calculus I Course: Perceptions of Collaboration, Community and Support</b> .....	1626
<i>A. Minichiello, J. Marquit, J. Dorward, C. Hailey</i>	
<b>9119 - Engaged in Thermodynamics - Learning What We Don't Know</b> .....	1648
<i>P. Tebbe</i>	
<b>8895 - Engineering Technology Pathways: The Food and Foodstuff Supply Chain</b> .....	1656
<i>C. Laux</i>	
<b>9823 - Engineering to Enhance STEM Integration Efforts</b> .....	1666
<i>T. Moore, K. Tank, A. Glancy, E. Siverling, C. Mathis</i>	
<b>10355 - Enhancing the STEM Curriculum Through a Multidisciplinary Approach that Integrates Biology and Engineering</b> .....	1681
<i>J. Vernengo, S. Farrell, J. Kadlowec, J. Strobel</i>	
<b>10038 - Establishing a Win-Win Partnership between a University and Non-metropolitan Community Colleges</b> .....	1695
<i>M. Anderson-Rowland, A. Rodriguez, A. Grierson, R. Hall Jr., P. McBride, R. Pangasa, C. Vanglider, R. Cox, T. Palmer</i>	
<b>9469 - Events that Promote Engineering Students' Intrinsic Motivation to Learn</b> .....	1706
<i>K. Trenshaw, R. Alonso, K. Earl, G. Herman</i>	
<b>9705 - Evidence for the Effectiveness of a Grand Challenge-based Framework for Contextual Learning</b> .....	1715
<i>L. Huettel, M. Gustafson II, J. Nadeau, D. Schaad, M. Barger, L. Linnenbrink-Garcia</i>	
<b>10301 - Expansion and Evaluation of a Step-Based Tutorial Program for Linear Circuit Analysis</b> .....	1726
<i>B. Skromme, P. Rayes, B. Cheng, B. McNamara, A. Gibson, A. Barrus, J. Quick, R. Atkinson, Y. Huang, D. Robinson</i>	
<b>9957 - Experience Developing and Implementing an NSF REU Site on Sustainable Management and Beneficial Reuse of Residual Wastes and Byproducts</b> .....	1740
<i>G. Fiegel, J. Hanson, N. Yesiller</i>	



### VOLUME 3

<b>8842 - Experimental Nanomaterials and Nanoscience - An Interdisciplinary Laboratory Course</b> .....	1754
<i>H. Huang, S. Higgins, A. Blake, J. Deibel, I. Sizemore</i>	
<b>10732 - Exploring the Disconnect between Self Determination Theory (SDT) and the Engineering Classroom Environment</b> .....	1764
<i>K. Sobhan, E. An, R. Sherman, N. Romance, N. Brown</i>	
<b>9059 - Feedback in Complex, Authentic, Industrially Situated Engineering Projects using Episodes as a Discourse Analysis Framework - Year 2</b> .....	1778
<i>M. Koretsky, E. Nefcy, D. Gilbuena, J. Whinnery</i>	
<b>10427 - Forestry Robot Design</b> .....	1785
<i>M. Yilmaz, S. Ozcelik, N. Yilmazer, R. Nekovei</i>	
<b>8617 - Forming a Coalition to Decrease Freshout Rampup Time in the Engineering Workplace: A Business Plan for an Academic, Industry, and Government Partnership</b> .....	1802
<i>S. Villachica, D. Plumlee</i>	
<b>10905 - Fusing Rapid Manufacturing with 3D-Virtual Facility and Cyber Tutor System into Engineering Education</b> .....	1834
<i>T.-L. Tseng, R. Chiou, R. Belu</i>	
<b>10091 - Game-Aided Pedagogy to Improve Students' Learning Outcomes and Engagement in Transportation Engineering</b> .....	1846
<i>M. Abbas, L. McNair</i>	
<b>9526 - Green Plastics Laboratory by Process Oriented Guided Inquiry Learning (POGIL)</b> .....	1864
<i>S. Kim, S. Faseyitan</i>	
<b>9983 - Hands on Made4Me: Hands-on Machining, Analysis and Design Experiences for Mechanical Engineers</b> .....	1874
<i>J. Vaillant, C. Hansen, J. Stolk, S. Johnston, S. Shina, D. Willis</i>	
<b>10871 - IDEA-Pen: Interactive Design and Analysis through a Pen-based Interface</b> .....	1915
<i>A. Sriram, M. Cardella, K. Ramani</i>	
<b>9478 - Improvements through the Second Year Research Experiences for Teachers Program</b> .....	1930
<i>T. Kaya</i>	
<b>9054 - Improving Students' Soft Skills through a NSF-Supported</b> .....	1937
<i>R. Brown, M. Ahmadian</i>	
<b>9552 - Increasing Opportunities and Improving Outcomes for Undergraduate Students in the College of XXX</b> .....	1943
<i>A. Kline, B. Aller, I. Abdel-Qader</i>	
<b>8678 - Increasing Retention in Engineering and Computer Science with a Focus on Academically At-Risk First Year and Sophomore Students</b> .....	1953
<i>S. Jones, Z. Naegele, T. Vandegrift</i>	
<b>10163 - Informal Pathways to Engineering: Preliminary Findings</b> .....	1959
<i>M. Cardella, M. Wolsky, C. Paulsen, T. Jones</i>	
<b>10367 - Information Literacy Skill Development and Assessment in Engineering</b> .....	1974
<i>S. Purzer, M. Fosmire, A. Epps, R. Wertz, K. Douglas</i>	
<b>10099 - Integrating Sustainability Grand Challenges and Experiential Learning into Engineering Curricula: a TUES2 Collaborative Research Project</b> .....	1981
<i>C. Antaya, M. Bilec, E. Adams, M. Chester, K. Parrish, T. Seager, A. Landis</i>	
<b>8888 - Integration of Experiential Learning to Develop Problem Solving Skills in Deaf and Hard of Hearing STEM Students</b> .....	1984
<i>A. Carrano, W. Dannels, M. Marshall</i>	
<b>9458 - Interactive, Modular Experiments and Illustrative Examples to Integrate Pharmaceutical Applications in the Chemical Engineering Curriculum and K-12 Outreach Programs</b> .....	1997
<i>Z. Gephardt, S. Farrell, M. Savelski, C. Slater</i>	
<b>8808 - Investigating Impacts on the Ideation Flexibility of Engineers</b> .....	2018
<i>S. Yilmaz, K. Jablokow, S. Daly, E. Silk, M. Rosenberg</i>	
<b>10148 - JTF Web-Enabled Faculty and Student Tools for More Effective Teaching and Learning Through Two-Way, Frequent Formative Feedback</b> .....	2033
<i>S. Krause, D. Baker, A. Carberry, T. Alford, C. Ankeny, M. Koretsky, B. Brooks, D. Gilbuena, C. Waters, B. Gibbons, W. Stuart, S. Maass, C. Chan</i>	
<b>10328 - Live Energy: US Faculty Co-Author an Electronic Textbook to Deliver the Most Up-to-date and Relevant Content in Energy and Sustainability</b> .....	2047
<i>C. Ehlig-Economides, B. Yalvac, E. Binks-Cantrell, S. Pisupati, D. Gilman, R. Toossi, S. Aghara, T. Robinson, D. Smith, M. Ayar</i>	
<b>8584 - Louisiana State University and Baton Rouge Community College - A Partnership for STEM Student Success</b> .....	2071
<i>S. Dann, J. Ales, K. Elkholy</i>	
<b>9985 - Making and Engineering: Understanding Similarities and Differences</b> .....	2078
<i>J. Oplinger, A. Heiman, M. Dickens, C. Foster, S. Jordan, M. Lande</i>	
<b>9860 - Measuring the Effects of Precollege Engineering Education</b> .....	2087
<i>N. Salzman, M. Ohland, M. Cardella</i>	
<b>9045 - New Mechatronics Curriculum on Multi-axis Industrial Motion Control</b> .....	2093
<i>H. Gurocak, A. Kranov</i>	
<b>8558 - NSF TUES: Transforming Undergraduate Environmental Engineering Laboratories for Sustainable Engineering using the Case Studies in the Sciences Instructional Method</b> .....	2108
<i>S. Luster-Teasley, S. Hargrove-Leak, C. Waters</i>	

<b>9562 - NSF-NUE: NanoTRA- Texas Regional Alliance to foster 'Nanotechnology Environment, Health, and Safety Awareness' in tomorrow's Engineering and Technology Leaders</b> .....	2119
<i>J. Tate, D. Fazarro, J. Hanks, W. Trybula, S. Dutta, R. McLean, F. Allhoff</i>	
<b>10224 - NSF-NUE: Using Nanotechnology to Engage Students from High School through Graduate School</b> .....	2132
<i>R. Castillejos</i>	
<b>8733 - On Developing a Software Defined Radio Laboratory Course for Undergraduate Wireless Engineering Curriculum</b> .....	2137
<i>S. Mao, Y. Huang, Y. Li</i>	
<b>10013 - Organ-izing the Engineering Curriculum with Biomedically Related Learning Modules</b> .....	2153
<i>S. Farrell, J. Vernengo, T. Merrill, J. Kadlowec, M. Staehle, R. Polikar</i>	
<b>9098 - Planning Grant: Developing a National Higher Education Student Unit Record Database</b> .....	2164
<i>M. Ohland, R. Long</i>	
<b>10499 - Point-of-Care Medical Tests Devices and their Value as Educational Projects for Engineering Students</b> .....	2169
<i>M. Mauk, R. Chiou, M. Carr</i>	
<b>10891 - Preliminary Results of a RIGEE-funded Study: Pre-College Interactions, Early Expectations, and Perceived Barriers Among Entering Engineering Students</b> .....	2181
<i>M. Pando, B. Tempest, S. Dika</i>	
<b>9557 - Progress on the Engineering Ambassador Network: A Professional Development Organization with an Outreach Mission</b> .....	2184
<i>M. Alley, C. Haas, K. Thole, M. Marshall, J. Garner</i>	
<b>8700 - Project-Based Learning in Statics: Curriculum, Student Outcomes, and Ongoing Questions</b> .....	2197
<i>R. Atadero, M. Balgopal, K. Rambo-Hernandez, A. Casper</i>	
<b>9673 - Promoting the Adoption of Innovative Teaching Practices by Transportation Engineering Faculty in a Workshop</b> .....	2211
<i>M. Jannat, D. Hurwitz, S. Brown</i>	
<b>8900 - Quality of Life Technology Research Experience for Veterans/Teachers Program</b> .....	2220
<i>M. Mandala, M. Goldberg, J. Pearlman</i>	
<b>9848 - Research Experience for Teachers Site: A Work-in Progress Report</b> .....	2227
<i>V. Kapila</i>	
<b>10193 - Research Experiences For Teachers: Linking Research to Teacher Practice and Student Achievement</b> .....	2239
<i>G. Ragusa, M. Mataric, S. Huang, S. Levonisova</i>	
<b>10219 - Resources to Implement Flipped Chemical Engineering Classrooms: Course Packages</b> .....	2250
<i>G. Nicodemus, J. Falconer, W. Medlin, J. Grazia, K. McDanel</i>	
<b>9298 - Results from Implementation and Assessment of Case Studies in the Engineering Curriculum</b> .....	2257
<i>N. Delatte</i>	
<b>10681 - Scaffolding Cyber-Enabled Collaborative Learning in Engineering Courses and Its Impacts of on Students' Learning</b> .....	2265
<i>W. Zheng, Y. Cao, H. Das, J. Yin</i>	
<b>9543 - Science, Technology, Engineering and Mathematics (STEM) Careers: Strategies for Engaging and Recruiting Girls</b> .....	2284
<i>M. Barger, M. Boyette, N. Stokes</i>	
<b>10247 - Screencasts for Enhancing Chemical Engineering Education</b> .....	2297
<i>G. Nicodemus, J. Falconer, W. Medlin, K. McDanel, J. Grazia, J. Ferri, C. Anderson, M. Senra</i>	
<b>9102 - SMARTER Teamwork: System for Management, Assessment, Research, Training, Education, and Remediation for Teamwork</b> .....	2305
<i>M. Ohland, R. Layton, M. Loughry, D. Woehr, D. Ferguson, E. Salas, K. Heyne</i>	
<b>10399 - Software Defined Radio Laboratory Platform for Enhancing Undergraduate Communication and Networking Curricula</b> .....	2312
<i>Z. Wu, B. Wang, C. Cheng, A. Yaseen, D. Cao</i>	
<b>10500 - Solar Cell Imaging: A Gateway to Stem Disciplines</b> .....	2321
<i>M. Mauk, R. Chiou, M. Carr</i>	
<b>8812 - Solaris One - A Serious Game for Thermodynamics</b> .....	2337
<i>Y. Tang, K. Jahan, S. Shetty, C. Franzwa</i>	
<b>9802 - SSTEM Scholarship - A Scholarship Program to Enhance Education in Computer Science and Engineering Technology</b> .....	2345
<i>N. Swain</i>	
<b>8498 - Statics Concepts Inventory Results at Kettering University</b> .....	2354
<i>R. Echempati</i>	
<b>9858 - Studying &amp; Supporting Productive Disciplinary Engagement in STEM Learning Environments</b> .....	2368
<i>M. Koretsky, S. Nolen, D. Gilbuena, E. Lehtinen, M. Vauras, G. Tierney, S. Volet</i>	
<b>9454 - Teaching Freshman Design Using a Flipped Classroom Model</b> .....	2380
<i>A. Saterbak, M. Oden, A. Muscarello, M. Wettergreen</i>	
<b>9876 - Testing and Refinement of e-Learning Modules on Metacognition and Motivation</b> .....	2386
<i>M. Miller, S. Sorby, A. Kambale, M. Farrish</i>	
<b>9660 - The iCollaborate MSE Project: Progress Update 2014</b> .....	2392
<i>K. Kitto, D. Jusak</i>	
<b>8868 - The Use of Metacognitive Writing-to-learn Prompts in an Engineering Statics Class to Improve Student Understanding and Performance</b> .....	2412
<i>S. Goldberg, J. Rich, A. Masnick</i>	

<b>9201 - The Washington State Academic RedShirt (STARS) in Engineering Program</b> .....	2421
<i>J. Kingma, E. Riskin, J. Schneider, R. Olsen, S. Cunningham, D. Wiggin, K. Reinkens, S. Winter</i>	
<b>10620 - The Wright State Model for Engineering Mathematics Education: A Longitudinal Study of Student Perception Data</b> .....	2428
<i>N. Klingbeil</i>	
<b>8554 - Toys and Mathematical Options for Retention in Engineering (Toys'n MORE): Final Outcomes for Engineering Students Who Participated in Math Tutoring, a Toy-Based Freshman Design Course, or a Summer Bridge Program</b> .....	2439
<i>C. Cohan, A. Yin, A. Freeman, J. Gomez-Calderon, J. Margle, J. Lane, D. Sathianathan, R. Engel</i>	
<b>9663 - Traffic Signal System Misconceptions across Three Cohorts: Novice Students, Expert Students, and Practicing Engineers</b> .....	2471
<i>M. Islam, D. Hurwitz, S. Brown</i>	
<b>10046 - Transfer Students: Lessons Learned over 10 Years</b> .....	2481
<i>M. Anderson-Rowland</i>	
<b>9774 - Transfer-to-Excellence: Research Experiences for Undergraduates at California Community Colleges</b> .....	2489
<i>S. Artis, C. Amelink, T. Liu</i>	
<b>10044 - Transforming a Freshman Electrical Engineering Lab Course to Improve Access to Place Bound Students</b> .....	2497
<i>D. Thorsen, L. Sowa</i>	
<b>9112 - Understanding Diverse Pathways: Disciplinary Trajectories of Engineering Students</b> .....	2505
<i>S. Lord, M. Ohland, R. Layton</i>	
<b>10007 - User Research for the Instructional Module Development (IMOD) System</b> .....	2512
<i>O. Dalrymple, S. Bansal, A. Gaffar</i>	
<b>9940 - Virtual Community of Practice: Electric Circuits</b> .....	2520
<i>K. Connor, L. Huettel</i>	
<b>8512 - Workforce Development in Mechatronics- A Three Year NSF-ATE Project</b> .....	2531
<i>N. Latif, M. Zahraee, A. Sikoski, B. Rosul</i>	
<b>10250 - Working with Graduate Students in an Upper Division Students Program</b> .....	2542
<i>M. Anderson-Rowland</i>	
<b>10122 - Writing to Learn Engineering: Identifying Effective Techniques for the Integration of Written Communication into Engineering Classes and Curricula (NSF RIGEE project)</b> .....	2552
<i>C. Troy, R. Essig, B. Jesiek, J. Boyd, N. Trellinger</i>	

**M402 – AEROSPACE DIVISION TECHNICAL SESSION 1**

<b>8419 - Space Shuttle Case Studies: Challenger and Columbia</b> .....	2570
<i>S. Post</i>	
<b>10409 - Helicopters as a Theme in a Machine Design Course</b> .....	2587
<i>D. Turner, M. Nagurka</i>	
<b>10790 - An Undergraduate Course in Military Electronic Applications, aka Electronic Warfare</b> .....	2601
<i>G. Harding</i>	

**M403 – ARCHITECTURAL DESIGN TOPICS IN ARCHITECTURAL ENGINEERING**

<b>10120 - Investigation of Digital Three-Dimensional Representation: Results of a Faculty-Undergraduate Student Engagement Grant</b> .....	2616
<i>S. Aly, H. Shah</i>	

**VOLUME 4**

<b>10538 - The Integration of Building Codes into the Architecture Design Process</b> .....	2630
<i>A. Megri</i>	
<b>8811 - Balancing Daylight, LEDs, and Controls: The Future of Lighting for Designers</b> .....	2646
<i>L. Vanzee</i>	
<b>9721 - 3D Design: Form and Light</b> .....	2660
<i>M. Frank, B. Huffman</i>	

**M409 – BIOLOGICAL & AGRICULTURAL DIVISION TECHNICAL SESSION 1**

<b>8966 - Creativity and its Assessment in a Design and Development of Food Products and Processes Course</b> .....	2673
<i>S. Husted, N. Ramirez-Corona, A. Lopez-Malo, E. Palou</i>	
<b>10178 - Improvement of Bioengineering Courses Through Systems Biology and Bioprocess Modeling</b> .....	2685
<i>K. Dolan, Y. Tang, W. Liao</i>	

**M415 – SOCIO CULTURAL ELEMENTS OF LEARNING THROUGH SERVICE**

<b>10076 - Immersive Community Engagement Experience</b> .....	2697
<i>C. Zoltowski, A. Cummings, W. Oakes</i>	

<b>10351 - What is Design for Social Justice?</b> .....	2708
<i>J. Leydens, J. Lucena, D. Nieusma</i>	
<b>10625 - Sponsoring Research in Appropriate Technology</b> .....	2738
<i>C. Papadopoulos, W. Frey, M. Castro-Sitiriche, J. Rodriguez, J. Santiago, T. Medina, R. Maldonado, C. Rivera-Velez, D. Chacon-Hurtado, P. Aceveda</i>	
<b>8945 - Distinguishing Engineers of the Future: Comparisons with EWB-USA Members</b> .....	2760
<i>K. Litchfield, A. Javernick-Will, D. Knight, C. Leslie</i>	
<b>9136 - Research Institutions' Teaching Imperative: Rising to the Commitment of Service-Learning in Engineering Education</b> .....	2774
<i>B. Tucker, D. Kazmer, C. Swan, A. Bielefeldt, K. Paterson, O. Pierrakos, G. Rulifson, L. Barrington</i>	

**M416 – COMPUTER HARDWARE**

<b>8778 – Open-source Hardware in Controls Education</b> .....	2787
<i>M. Hopkins, A. Kibbe</i>	
<b>9644 - Use of a CPLD in an Introductory Logic Circuits Course with Software and Hardware Upgrade</b> .....	2798
<i>Y. Yu, K. Hill</i>	
<b>10836 - Teaching Robotics by Building Autonomous Mobile Robots Using the Arduino</b> .....	2814
<i>W. Walter, T. Southerton</i>	
<b>10183 - Using Hardware-based Programming Experiences to Enhance Student Learning in a Junior-level Systems Modeling Course</b> .....	2830
<i>J. Parker, S. Canfield, S. Ghafoor</i>	

**M417 – CURRICULAR ISSUES IN COMPUTING AND INFORMATION TECHNOLOGY PROGRAMS I**

<b>8560 - ArchiGaming: Finding the Overlap</b> .....	2847
<i>J. Chastine, R. Cole, C. Welty</i>	
<b>9626 - Teaching Interdisciplinary Teamwork Through Hands-on Game Development</b> .....	2867
<i>S. Kuhl, R. Pastel, R. George, C. Meyers, M. Freitag, J. Lund, M. Stefaniak</i>	
<b>10954 - Gamification of Physical Therapy for the Treatment of Pediatric Cerebral Palsy: A Pilot Study Examining Player Preferences</b> .....	2883
<i>D. Whittinghill, J. Brown</i>	
<b>8973 - Teaching Operating Systems Concepts with Execution Visualization</b> .....	2893
<i>F. Giraldeau, M. Dagenais, H. Boucheneb</i>	
<b>8800 - Leveraging the Power of Java and Matlab to Solve ODE's</b> .....	2908
<i>M. Muqri, H. Muqri, S. Chng</i>	

**M418 – ASSESSMENT IN CONSTRUCTION EDUCATION**

<b>10364 - An Assessment Tool for Using Videos and Rich Media in Construction Management Curriculum - A Case Study</b> .....	2930
<i>K. Hurtado, D. Kashiwagi, K. Sullivan</i>	
<b>10435 - Use of Online Assessment and Collaboration Tools for Sustainable Building Practices Course</b> .....	2941
<i>R. Liu, Y. Hatipkarasulu</i>	
<b>10842 - Mapping the Curriculum Around Student Learning Outcomes and Assessment of Learning</b> .....	2951
<i>I. Saad</i>	
<b>10139 - Assessing Comprehension With Student-Developed Construction Games</b> .....	2960
<i>C. Antaya, K. Parrish, M. Bilec, A. Landis</i>	
<b>9531 - Self-Efficacy, Motivation, and Locus of Control, Among Male and Female Construction Management Students</b> .....	2973
<i>J. Elliott, C. Puerto</i>	

**M420 – COOPERATIVE & EXPERIENTIAL EDUCATION DIVISION TECHNICAL SESSION 2**

<b>8542 - Transforming Undergraduate STEM Summer Internships in a Federal Government Institution for 21st Century Engineering Careers</b> .....	2982
<i>M. Lanzerotti, M. Varga, S. Creighton, D. Langley, D. Cahill, R. Martin</i>	
<b>9282 - Optimizing Summer Externships</b> .....	3004
<i>H. Thomas, M. Nowatkowski, B. Hoyer, M. Benson, B. Floersheim, L. Luznik, W. Anderson, S. Condy</i>	
<b>10484 - Assessing the Role of 21st Century Skills on Internship Outcomes in a Steel Multinational Enterprise</b> .....	3018
<i>J. Galvan, E. Casman, E. Fisher, I. Nair, M. Small</i>	
<b>10543 - The Influence of Internship Participation on Construction Industry Hiring Professionals When Selecting New Hires and Determining Starting Salaries for Construction Engineering Graduates</b> .....	3038
<i>K. Short, A. Pearce, C. Flori, T. Bulbul, A. McCoy</i>	

#### **M423 – DEVELOPING THE DESIGN SKILLSET**

<b>9602 - I'm Not the Creative Type: Barriers to Student Creativity within Engineering Innovation Projects</b> .....	3049
<i>N. Fila, S. Purzer, P. Mathis</i>	
<b>9776 - Facilitating the Teaching of Product Development</b> .....	3064
<i>C. Fredriksson, M. Eriksson, H. Melia</i>	
<b>9899 - Evaluating the Implementation of Design Heuristic Cards in an Industry Sponsored Capstone Design Course</b> .....	3085
<i>D. Kotys-Schwartz, S. Daly, S. Yilmaz, D. Knight, M. Polmear</i>	
<b>10069 - Immersive Experience Impact on Students' Understanding of Design</b> .....	3101
<i>A. Cummings, C. Zoltowski, M. Hsu, M. Cardella, W. Oakes</i>	
<b>10357 - Student Use of Design Ethnography Techniques During Front-end Phases of Design</b> .....	3118
<i>I. Mohedas, S. Daly, K. Sienko</i>	

#### **M424 – LABORATORY EXPERIENCES WITH SIGNAL PROCESSING AND CONTROLS**

<b>10325 - Teaching Digital Signal Processing Course with a Real-Time Digital Crossover System for Electrical and Computer Engineering Technology Students</b> .....	3127
<i>J. Jiang</i>	
<b>10008 - Synchronized Robot: A PID Control Project with the LEGO Mindstorm NXT</b> .....	3143
<i>C. Davis, A. Mai</i>	
<b>8483 - Development and Implementation of a Control Strategy for a Hybrid Power Train System in a Classroom Setting</b> .....	3159
<i>M. Acosta, K. Bhatia, H. Zhang, J. Kadlowec</i>	
<b>10263 - From Industry to Academic Laboratory: Lab-Scaled Industrial Web Handling System for Vision Evaluation and Detection of Wrinkles</b> .....	3168
<i>I. Husanu, Y. Ertekin, R. Belu</i>	

#### **M425 – TRENDS IN ENGINEERING EDUCATION 1**

<b>9932 - Determining the Effect of an Engineering Overview Assignment on First Year Students</b> .....	3187
<i>K. Mohd-Yusof, F. Phang, A. Sadikin, S. Helmi, M. Kamaruddin</i>	
<b>9948 - Influences on Engineering Instructors' Emphasis on Interdisciplinarity in Undergraduate Courses</b> .....	3202
<i>L. Lattuca, D. Knight, M. Brown</i>	
<b>9609 - Curricular Efficiency: What Role Does It Play In Student Success?</b> .....	3219
<i>J. Wigdahl, G. Heileman, A. Slim, C. Abdallah</i>	
<b>8618 - Student Perceptions of Instructional Change in Engineering Courses: A Pilot Study</b> .....	3231
<i>M. Borrego, M. Prince, C. Evan Nellis, P. Shekhar, C. Waters, C. Finelli</i>	

#### **M425B – METHODOLOGICAL & THEORETICAL CONTRIBUTIONS TO ENGINEERING EDUCATION 1**

<b>9944 - Identity-trajectory as a Theoretical Framework in Engineering Education Research</b> .....	3244
<i>L. Thomas</i>	
<b>8460 - Judging the Quality of Operationalization of Empirical-Analytical, Interpretive and Critical Science Paradigms in Engineering Education Research</b> .....	3255
<i>G. Rathore</i>	
<b>9938 - Issues Surrounding a Heutagogical Approach in Global Engineering Education</b> .....	3273
<i>Y. Gazi</i>	
<b>9230 - Integrating Reflection into Engineering Education</b> .....	3283
<i>J. Turns, B. Sattler, K. Yasuhara, J. Borgford-Parnell, C. Atman</i>	
<b>9956 - Collaboration within Engineering Education Research's Community of Practice</b> .....	3299
<i>S.-B. Fleming</i>	

#### **M426 – ASSESSMENT OF LEARNING IN ECE**

<b>8645 - Google Forms: A Real-Time Formative Feedback Process for Adaptive Learning</b> .....	3317
<i>R. Haddad, Y. Kalaani</i>	
<b>8646 - A Unified Approach to the Assessment of Student Learning Outcomes in Electrical Engineering Programs</b> .....	3331
<i>Y. Kalaani, R. Haddad</i>	
<b>8962 - Using Case Study Research as an Active Learning Tool for Demonstrating the Ability to Function on Multidisciplinary Teams</b> .....	3342
<i>W. Lu</i>	
<b>10786 - Impact of Simulation-based and Hands-on Teaching Methodologies on Students' Learning in an Engineering Technology Program</b> .....	3354
<i>M. Taher, A. Khan</i>	

9964 - Development of Student Motivation in a Required Electrical Engineering (EE) Course for Non-EE Majors .....	3376
<i>A. Ganago, S. Sivaramakrishnan, R. Demonbrun</i>	

**M428 – ENGINEERING AND PUBLIC POLICY DIVISION TECHNICAL SESSION 1: IN THE CLASSROOM**

8851 - The Efficacy of Case Studies for Teaching Policy in Engineering and Technology Courses .....	3391
<i>R. Chong, M. Dark, D. Depew, I. Ngambeki</i>	
9769 - Importance of Radio Regulation Policies in Wireless Communications Study .....	3411
<i>R. Kamali</i>	
10812 - Students Pursuing Senior Projects Analyze the Public Need and Draft the Public Policy .....	3424
<i>M. Teitell, W. Sullivan</i>	
9150 - Evolution of Engineering and Public Policy Undergraduate Program at Carnegie Mellon University .....	3435
<i>D. Matthews</i>	

**M432 – GRADUATE ETHICS EDUCATION & PROFESSIONAL CODE**

8996 - Ethical Concerns of Unmanned and Autonomous Systems in Engineering Programs .....	3444
<i>R. Stansbury, J. Olds, E. Coyle</i>	
10155 - Ethnography in Engineering Ethics Education: A Pedagogy for Transformational Listening .....	3457
<i>Y. Lambrinidou, W. Rhoads, S. Roy, E. Heaney, G. Ratajczak, J. Ratajczak</i>	
10610 - The Continuing Shock of the New: Some Thoughts on why Law, Regulation, and Codes are Not Enough to Guide Emerging Technologies .....	3484
<i>J. Hanks, D. Fazarro, J. Tate, W. Trybula, R. McLean</i>	
8544 - Ethics of Regulated Biomedical Device Design .....	3498
<i>N. Barakat, N. Sunny, M. Hasan</i>	

**VOLUME 5**

**M434 – ENGINEERING LEADERSHIP DEVELOPMENT CONSTITUENT COMMITTEE DIVISION TECHNICAL SESSION 2**

9674 - Lessons Learned: Teaching Engineering Leadership in an Undergraduate Class using Case Studies .....	3507
<i>B. Ahn, M. Cox, A. Osagiede</i>	
9105 - Longitudinal Evolution of an Inclusive, College-Wide Integrated Engineering Leadership Curriculum .....	3515
<i>A. Bowden, G. Warnick, S. Megleby</i>	
9937 - Leadership in Multidisciplinary Project Teams: Investigating the Emergent Nature of Leadership in an Engineering Education Context .....	3525
<i>M. Feister, C. Zoltowski, P. Buzzanell, W. Oakes, Q. Zhu</i>	
10415 - Utilizing a Student Organization to Create a Self-Sustaining Mentorship Program in Engineering .....	3539
<i>S. King, S. Fadrigalan, A. Steele, S. Dann, W. Waggenspack Jr.</i>	
10938 - Integrating Leadership Education into the Undergraduate Engineering Experience .....	3546
<i>T. Kotmour, C. Reilly</i>	

**M439A – CURRICULUM & STUDENT ENROLLMENT I**

9515 - Program Accreditation: Developing a Methodology to Retrieve and Maintain Relevant Data for Course Improvement and Provide an Assessment Process Which Closes the Loop .....	3557
<i>V. Ray, J. White, D. Koo</i>	
9642 - Incorporating Sustainability throughout the Manufacturing Engineering Technology Curriculum .....	3571
<i>I. Edinbarough, P. Rao, K. Das</i>	
9796 - A Multi-Tier Approach to Cyber Security Education, Training, and Awareness in the Undergraduate Curriculum (CSETA) .....	3587
<i>N. Swain</i>	

**M440 – ENTREPRENEURSHIP & ENGINEERING INNOVATIVE DIVISION OPENING GENERAL SESSION 2**

9023 - Comparing Engineering and Business Undergraduate Students' Entrepreneurial Interests and Characteristics .....	3596
<i>Q. Jin, S. Gilmartin, S. Sheppard, H. Chen</i>	
10336 - Exploring Entrepreneurial Characteristics and Experiences of Engineering Alumni .....	3626
<i>J. Rodriguez, H. Chen, S. Sheppard, Q. Jin, S. Brunhaver</i>	
9284 - Rethinking Innovation: Characterizing Dimensions of Impact .....	3641
<i>F. Solis, J. Sinfield</i>	
10497 - Initial Investigation of Analytic Hierarchy Process to Teach Creativity in Design and Engineering .....	3655
<i>J. Michaeli, G. Hou, X. Hu, M. Hou</i>	

## **M442 – FPD 2: BUILDING COMMUNITY**

<b>9852 - Multi-Course Alignment for 1st Year Engineering Students: Mathematics, Physics, and Programming in MATLAB</b> .....	3676
<i>C. Liron, H. Steinhauer, J. Raghavan, B. Berhane</i>	
<b>9570 - Impact of Nanotechnology Themed Learning Community (TLC) Program in Freshmen Engineering</b> .....	3699
<i>M. Agarwal, M. Rizkalla, S. Shrestha, K. Varahramyan</i>	
<b>8864 - Informal Peer-Peer Collaboration, Performance, and Retention for First Semester Engineering Students</b> .....	3707
<i>N. Honken, P. Ralston</i>	
<b>10916 - Developing Leadership Skills and Creating Community in Engineering Students</b> .....	3719
<i>B. Willis, D. Willis, M. Fontenot</i>	

## **M445 – INSTRUMENTATION DIVISION TECHNICAL SESSION 1**

<b>10727 - Programming a Scara Robot for a Manufacturing Cell to Assemble and Produce Medical Devices</b> .....	3729
<i>A. Hossain, M. Hossain, M. Jahan</i>	
<b>9275 - Virtual Joystick Control of Finch Robot</b> .....	3748
<i>D. Loker, S. Strom</i>	
<b>9584 - Inductive Learning Tool Improves Instrumentation Course</b> .....	3761
<i>J. Smith</i>	
<b>10699 - Designing, Building, and Testing an Autonomous Search and Rescue Robot - An Undergraduate Applied Research Experience</b> .....	3774
<i>Z. Hazelwood, S. Sbenaty</i>	

## **M447 – ADDRESSING THE NGSS, PART 1 OF 3: SUPPORTING K 8 SCIENCE TEACHERS IN ENGINEERING PEDAGOGY AND ENGINEERING SCIENCE CONNECTIONS**

<b>8975 - Engineering Teaching Behaviors in PK-3 Classrooms</b> .....	3789
<i>S. Molitor, J. Kaderavek, H. Dao, N. Liber, R. Rotshtein, G. Milewski, C. Czerniak</i>	
<b>9250 - Effects of Continuous Teacher Professional Development in Engineering on Elementary Teachers</b> .....	3805
<i>S. Yoon, Y. Kong, H. Diefes-Dux, J. Strobel</i>	
<b>9447 - Student Videos as a Tool for Elementary Teacher Development in Teaching Engineering: What Do Teachers Notice? (Research to Practice)</b> .....	3819
<i>M. McCormick, K. Wendell, B. O'Connell</i>	
<b>9224 - Teachers' Attempts Assessing Middle School Engineering Design Work</b> .....	3837
<i>M. Hynes, T. Moore, S. Purzer</i>	
<b>9427 - Engineering for Colonial Times</b> .....	3850
<i>M. McCormick</i>	

## **M447B – ENGINEERING ACROSS THE K 12 CURRICULUM: INTEGRATION WITH THE ARTS, SOCIAL STUDIES, SCIENCE, AND THE COMMON CORE**

<b>8680 - Changes in Elementary Students' Engineering Knowledge Over Two Years of Integrated Science Instruction (Research to Practice) Strand: Engineering across the K-12 curriculum: Integration with the Arts, Social Studies, Science, and the Common Core</b> .....	3867
<i>M. Tafur, K. Douglas, H. Diefes-Dux</i>	
<b>9463 - Energy Inquiry: Hands-on, Inquiry Learning Methods to Enhance STEM Learning by Engaging Students in Renewable Energy Solutions (Research to Practice)</b> .....	3882
<i>L. Wilkins, L. Bristol, G. Devey</i>	
<b>9880 - Linking the E and M in STEM</b> .....	3898
<i>E. Morgan, E. Fitzgerald, J. Hertel</i>	
<b>10284 - Using Curriculum-Integrated Engineering Modules to Improve Understanding of Math and Science Content and STEM Attitudes in Middle Grade Students</b> .....	3912
<i>J. Harlan, S. Pruet, J. Haneghan, M. Dean</i>	

## **M449 – TEACHING AND ASSESSMENT METHODOLOGIES**

<b>8713 - Partnering with Industry for Providing Experiential Learning in an Undergraduate Class in Industrial Distribution</b> .....	3927
<i>B. Nepal, B. Lawrence, E. Rodriguez-Silva</i>	
<b>9352 - Team-Teaching Secondary STEM Courses</b> .....	3936
<i>M. Creasy, N. Otte</i>	
<b>10379 - A New Educational Paradigm to Train Skilled Workers With Real World Practice</b> .....	3942
<i>J. Song</i>	

<b>10094 - Using the Four Pillars of Manufacturing Engineering Model to Assess Curricular Content for Accreditation Purposes</b> .....	3954
<i>C. Plouff, C. Pung, H. Jack</i>	

#### **M450 – MATERIALS DIVISION TECHNICAL SESSION 1**

<b>8708 - Interactive Module for Biomaterial Modeling and Characterization</b> .....	3970
<i>K. Singh, F. Khan</i>	
<b>10445 - Characterizing and Addressing Student Learning Issues and Misconceptions (SLIM) with Muddiest Point Reflections and Fast Formative Feedback</b> .....	3983
<i>S. Krause, D. Baker, T. Alford, C. Ankeny, M. Koretsky, B. Brooks, C. Waters, B. Gibbons, S. Maass, C. Chan</i>	
<b>10563 - Customizable Virtual X-Ray Laboratory: An Innovative Tool for Interactive Online Teaching and Learning</b> .....	4001
<i>Y. Cherner, M. Kuklja, A. Rudy</i>	
<b>10150 - Leveraging Student's Interests in a Senior Design Project Through Integration of Materials Selection Methodology</b> .....	4013
<i>M. Vollaro, M. Brennan</i>	
<b>9760 - Comparison of On-Campus and Distance Learning Preferences in a Junior-level Materials Science Course</b> .....	4026
<i>M. Cavalli, J. Neubert, D. Worley</i>	

#### **M452 – PROGRAMMING, SIMULATION AND DYNAMIC MODELING**

<b>8545 - Improving Transitions Between Sophomore Dynamics and Junior Dynamic Systems Courses</b> .....	4035
<i>M. Bedillion, R. Raisanen, M. Nizar</i>	
<b>8643 - The Balance of Theory, Simulation and Projects for Mechanical Component Design Course</b> .....	4045
<i>X. Le, A. Duva, M. Jackson</i>	
<b>8825 - Laboratory Development for Dynamic Systems Through the Use of Low Cost Materials and Toys</b> .....	4061
<i>B. Campbell, L. Monterrubio, T. Kerzmann</i>	
<b>9503 - An Interactive Programming Course Model for Mechanical Engineering Students</b> .....	4075
<i>S. Reckinger, S. Reckinger</i>	

#### **M453 – TEACHING STATICS**

<b>8509 - Development of a Cognitive Tutor for Learning Truss Analysis</b> .....	4098
<i>P. Steif, L. Kara, L. Fu</i>	
<b>8679 - Evaluation of Student Learning Outcomes Due to Self-Guided Engineering Analysis of Surroundings</b> .....	4112
<i>D. Berg</i>	
<b>9107 - Increasing Conceptual Understanding in an Engineering Core Course using a Statics Visualization Program</b> .....	4127
<i>O. Powell, M. Richard, D. Jensen, N. Brown</i>	
<b>10249 - Improving Retention of Student Understanding by Use of Hands-on Experiments in Statics</b> .....	4136
<i>C. Ramming, J. Phillips</i>	
<b>10917 - Mastery Learning in Engineering: A Case Study in Statics</b> .....	4164
<i>S. Sangelkar, O. Ashour, R. Warley, O. Onipede Jr.</i>	

#### **M454 – ENGAGING MINORITY PRE COLLEGE AND TRANSFER STUDENTS IN ENGINEERING**

<b>10893 - Pre-College Interactions, Early Expectations, and Perceived Barriers: Are There Differences for Underrepresented Engineering Students?</b> .....	4183
<i>S. Dika, M. Pando, B. Tempest</i>	
<b>10343 - Exposing Middle and High School Students to the Breadth of Computer Science</b> .....	4193
<i>D. Stone, Q. Brown</i>	
<b>8856 - African American High School Students' Human-Centered Approach to Design</b> .....	4204
<i>S. Gregory, N. Mentzer, K. Becker</i>	
<b>10307 - MOTIVATE: Bringing Out the Fun with 3D Printing and E-Textiles for Middle- and High-School Girls</b> .....	4227
<i>Q. Brown, J. Burge</i>	
<b>9849 - A Review of the Literature on Transfer Student Pathways to Engineering Degrees</b> .....	4239
<i>A. Ogilvie</i>	

#### **M455 - NANOTECHNOLOGY**

<b>8676 - First-Year Engineering Students' Communication of Nanotechnology Size &amp; Scale in a Design Challenge</b> .....	4253
<i>K. Rodgers, Y. Kong, H. Diefes-Dux, K. Madhavan</i>	
<b>10093 - Impact of Multidisciplinary Nanotechnology Curricula on Engineering and Science Programs</b> .....	4277
<i>M. Agarwal, M. Rizkalla, S. Shrestha, H. El-Mounayri, K. Varahramyan</i>	



<b>9794 - Multidisciplinary Undergraduate Minor Program in Nano-Science and Technology at North Carolina State University</b> .....	4288
<i>E. Veety, M. Ozturk, M. Escuti, J. Muth, V. Misra</i>	

**M458 – NUCLEAR AND RADIOLOGICAL DIVISION TECHNICAL SESSION 2**

<b>10990 - Thorium Fuel Cycle for a Molten Salt Reactor: State of Missouri Feasibility Study</b> .....	4300
<i>Y. Lee, M. Simones, J. Kennedy, H. Us, P. Makarewicz, J. Neher, M. Prelas</i>	
<b>9128 - A 3D, Interactive Virtual Instruction Laboratory</b> .....	4329
<i>Y. Li, R. Uddin, X. Zhu, I. Haddish</i>	
<b>10877 - Repurposing MCNP Use for Nuclear Engineering Demonstrations While Applying Physics Education Research (PER) Best Practices</b> .....	4335
<i>B. Sones</i>	
<b>10774 - A Review of Nuclear Pumped Lasers and Applications (Asteroid Deflection)</b> .....	4344
<i>M. Prelas, M. Watermann, D. Wisniewski, J. Neher, C. Weaver III</i>	

**M461 – ENGINEERING PHYSICS & PHYSICS DIVISION TECHNICAL SESSION 1**

<b>8451 - Take Ownership of Learning Outside Classroom: Reflection through Journal Writing in a Conceptual Physics Course</b> .....	4371
<i>W. Guo</i>	
<b>8735 - A New Teaching Approach for Ancient Engineering Physics: Master Physics via Mastering Physics! A Study and Survey</b> .....	4381
<i>B. Maheswaran</i>	

**VOLUME 6**

<b>9527 - Results of a Multi-Year Assessment of Inquiry-Based Second Semester General Physics Laboratory Activities</b> .....	4389
<i>R. Ross, E. Venugopal, G. Hillebrand, M. Murray, M. Gonderinger</i>	
<b>9214 - SAGE off Stage: Teaching Electromagnetics with Symbolic Computation Tool</b> .....	4401
<i>Y. Zhang, D. Probst</i>	
<b>8929 - Teaching Vectors To Engineering Students Through an Interactive Vector Based Game</b> .....	4408
<i>J. O'Brien, G. Sirokman</i>	

**M468 – THE PHILOSOPHY OF ENGINEERING AND TECHNICAL LITERACY**

<b>9586 - Defining Engineering Education</b> .....	4415
<i>A. Cheville</i>	
<b>8687 - Defining Engineering and Technological Literacies Within the Framework of Liberal Education: Implications for the Curriculum</b> .....	4439
<i>J. Heywood</i>	
<b>9990 - How Would Philosophy of Engineering Help Us Conducting Better Classes in Engineering Disciplines?</b> .....	4457
<i>M. Mina</i>	
<b>9030 - Using Multiple Methods to Promote Technological Literacy</b> .....	4467
<i>W. Loendorf, J. Durfee</i>	

**M470 – A FOCUS ON NON TRADITIONAL STUDENTS AND NON-TRADITIONAL COURSE DELIVERY METHODS**

<b>9757 - Building Technical Capital in the Technology Education</b> .....	4486
<i>A. Noravian, P. Irvine</i>	
<b>9164 - Nontraditional Student Access and Success in Engineering</b> .....	4502
<i>J. Bushey-McNeil, M. Ohland, R. Long</i>	
<b>8631 - Leadership Development for Engineering Technology Faculty: Becoming an Educational Leader through Knowledge Generation, Application, and Contribution</b> .....	4513
<i>E. Craft, L. Ritchie, S. Mikolaski</i>	
<b>9209 - Integrating Sustainability Engineering into Second-Year Composition</b> .....	4527
<i>C. Gomez, L. Braniger</i>	

**M510 – INNOVATIONS IN PEDAGOGY**

<b>9864 - Tiered Mentorship Experiences in Biomedical Engineering Programs: A Case Study of Collaborations between Undergraduates and High School Students</b> .....	4541
<i>C. Langman, E. Brey, J. Zawojewski</i>	

<b>10014 - Flipped Biomedical Engineering Classroom using Pencasts and Muddiest Point Web-enabled Tools</b> .....	4552
<i>C. Ankeny, S. Krause</i>	
<b>10344 - Promoting Active Learning in Biomedical Engineering Classes through Blended Instruction</b> .....	4569
<i>A. Nimunkar, X. Zhang, M. Shokouejad, J. Webster</i>	
<b>9545 - A Course in Biomaterials Taught Using the Socratic Method</b> .....	4583
<i>W. Guilford, M. Lawrence</i>	
<b>9966 - Introducing High School Students to Biomedical Engineering through Summer Camps</b> .....	4598
<i>M. Nasir, J. Seta, E. Meyer</i>	

## **M512 – CURRICULUM DEVELOPMENT AND ASSESSMENT IN CHEMICAL ENGINEERING**

<b>9125 - Examining Diffusion Networks and Identifying Opinion Leaders: A Case Study of the AIChE Concept Warehouse</b> .....	4613
<i>D. Gilbuena, C. Smith, B. Brooks, M. Koretsky</i>	
<b>9976 - Results from the AIChE Education Annual Survey: Chemical Engineering Electives</b> .....	4628
<i>M. Vigeant, D. Silverstein</i>	
<b>9491 - A Systematic Approach to Prepare for ABET Accreditation</b> .....	4639
<i>V. Wilczynski, I. Quagliato</i>	

## **M513 – BOK2 INFLUENCING CHANGES TO THE ABET CIVIL ENGINEERING PROGRAM CRITERIA AND CIVIL ENGINEERING CURRICULA**

<b>8692 - New Civil Engineering Program Criteria: How the Sausage is Being Made</b> .....	4654
<i>A. Estes, T. Lenox</i>	
<b>9142 - Adopting the BOK2 Student Outcomes: A Six-Year Retrospective</b> .....	4675
<i>D. Carpenter, J. Tocco</i>	
<b>10734 - Course Enhancement by Melding the BOK2 Student Outcomes with the Project Management Body of Knowledge</b> .....	4695
<i>J. Tocco</i>	

## **M514 – COLLEGE INDUSTRY PARTNERSHIPS DIVISION TECHNICAL SESSION 1**

<b>8681 - College-Industry Design Project Case Study: Process Heater Simulator</b> .....	4715
<i>C. Baukal Jr., A. Walter, B. Dickie</i>	
<b>8820 - Capstone Project Challenges: How Industry Sponsored Projects Offer New Learning Experiences</b> .....	4726
<i>C. Steinlicht, B. Garry</i>	
<b>10799 - Simulating Real World Work Experience in Engineering Capstone Courses</b> .....	4737
<i>T. Deagostino, V. Jovanovic, B. Thomas</i>	
<b>8714 - A Successful Partnership between Industry and Academia: Curriculum Improvement, Research, and Outreach through Collaboration with Industry</b> .....	4750
<i>I. Hurtado, J. Crichigno, A. Perez</i>	
<b>9363 - University-Industry Partnership in Semiconductor Engineering</b> .....	4768
<i>T. Dallas, T. Karp, B. Nutter, Y.-C. Lie, R. Gale, R. Cox, S. Bayne</i>	

## **M516 – COMPUTER PROGRAMMING AND SIMULATION**

<b>10955 - Improving the Affective Element in Introductory Programming Coursework for the “Non Programmer” Student</b> .....	4781
<i>D. Whittinghill, D. Nelson, K. Richard, C. Calahan</i>	
<b>8939 - Evaluation of an Introductory Embedded Systems Programming Tutorial using Hands-on Learning Methods</b> .....	4792
<i>G. Drayer, A. Howard</i>	
<b>10728 - RoboSim for Integrated Computing and STEM Education</b> .....	4804
<i>K. Gucwa, H. Cheng</i>	
<b>10210 - On the Road With Codester: Using An Educational App To Teach Computer Science To Grade 1-6 Students</b> .....	4821
<i>G. Rusak</i>	
<b>9814 - MATLAB-Based Finite Element Analysis in a Vibrations Class</b> .....	4833
<i>J. Baker</i>	

## **M517 – NEW TRENDS IN COMPUTING AND INFORMATION TECHNOLOGY EDUCATION**

<b>8788 - Equipping Graduates for the 21st Century Workplace: What IT Competencies Matters Most to Stakeholders</b> .....	4859
<i>T. Stanko, O. Zhirosh</i>	
<b>9295 - Factors Affecting First Year Retention of CIT Students</b> .....	4871
<i>V. Smith, E. Fernandez</i>	

<b>8604 - A Mature Approach to Assessment</b> .....	4882
<i>S. Zilora, J. Leone</i>	
<b>8720 - Information Technology for Communities: Development of a Web-based 3D Visualization and Cluster Computing System for Disaster Management</b> .....	4892
<i>G. Jin, G. Dekker Jr., J. Moreland, B. Nicolai</i>	
<b>8863 - Analysis of Student Perceptions and Behaviors in a Flipped Classroom Undergraduate Information Technology Course</b> .....	4904
<i>R. Elliott</i>	

### **M518 – INDUSTRY COLLABORATION IN CONSTRUCTION EDUCATION**

<b>9204 - Development of Effective Extracurricular Construction Technology Education Programs for University and Industry Collaborations</b> .....	4925
<i>D. Koo, J. White, V. Ray</i>	
<b>9955 - Developing a Professional Internship for Faculty in Construction Higher Education Programs</b> .....	4936
<i>R. Palomera-Arias, C. Capano</i>	
<b>10199 - Industry-based Learning Experiences in Project Planning and Scheduling</b> .....	4946
<i>M. Maghiar</i>	
<b>8755 - Faculty Internship: Providing New Skills for Construction Educators</b> .....	4959
<i>L. Holliday, M. Reyes, K. Robson</i>	

### **M523 - ASSESSMENT**

<b>9168 - The Development of a Rubric to Evaluate and Promote Students' Integration of Stakeholder Considerations into the Engineering Design Process</b> .....	4966
<i>A. Coso, A. Pritchett</i>	
<b>9582 - Aligning Design to ABET: Rubrics, Portfolios, and Project Managers</b> .....	4988
<i>A. Chevillie, M. Thompson</i>	
<b>9982 - Student Perceptions of Project Mentoring: What Practices and Behaviors Matter?</b> .....	5013
<i>M. Paretti, B. Lutz</i>	
<b>9921 - Measuring Qualities of Different Engineering Design Process Models: A Critical Review</b> .....	5024
<i>M. Lande</i>	
<b>9949 - the Discourse of Design: Examining Students' Perceptions of Design in Multidisciplinary Project Teams</b> .....	5049
<i>M. Feister, C. Zoltowski, P. Buzzanell, W. Oakes, Q. Zhu</i>	

### **M525B – METHODOLOGICAL & THEORETICAL CONTRIBUTIONS TO ENGINEERING EDUCATION 2**

<b>10065 - Validation of the Student Attitudinal Success Inventory II for Engineering Students</b> .....	5062
<i>S. Yoon, P. Imbrie, J. Lin, K. Reid</i>	
<b>9671 - Wanna Take a Survey? Exploring Tools to Increase Undergraduate Student Response Rates to Real-Time Experience Surveys</b> .....	5076
<i>D. Smalls, H. Matusovich</i>	
<b>9827 - Utilizing Think-Aloud Protocols to Assess the Usability of a Test for Ethical Sensitivity in Construction</b> .....	5088
<i>K. Sands II, D. Simmons</i>	
<b>9851 - The Distribution of Family Friendly Benefits Policies across Higher Education Institutions: A Cluster Analysis</b> .....	5104
<i>C. Schimpf, J. Main</i>	

### **M526 – INNOVATIVE PROJECTS IN ENERGY EDUCATION**

<b>8418 - Passive Circuits for Active Learning Revisited</b> .....	5121
<i>S. Post</i>	
<b>8806 - UML Laboratory in a Box, a New Way of Teaching ECE Labs</b> .....	5132
<i>J. Weitzen, A. Rux, E. Webster</i>	
<b>8907 - Engineering Project Platform for Electrical and Computer Engineering Curriculum Integration</b> .....	5141
<i>R. Sundaram</i>	
<b>10276 - Measurement and Automation: Experiential Learning Opportunity</b> .....	5155
<i>J. Dyer, D. Sandmann, C. Davis</i>	

### **M527 – INNOVATIVE PROJECTS IN ENERGY EDUCATION**

<b>8547 - Undergraduate Research and Development Explores new Technologies in Energy Conservation Innovations</b> .....	5170
<i>S. Foroudastan, J. Posey Sr.</i>	
<b>9868 - Investigation of a Manufacturing Process for Intermediate to Mass Production of Polymer Graphite Based Bipolar Plates for Proton Exchange Membrane Fuel Cells</b> .....	5179
<i>V. Gurau</i>	

10192 - Green Technology for Disaster Relief and Remote Areas .....	5187
<i>S. Qazi, F. Qazi</i>	
9544 - A Multi-Year Thermoelectric Energy Harvesting Project for First-Year Engineering and Technology Students .....	5199
<i>D. Litwhiler</i>	

### **M530 – SPATIAL ABILITY & VISUALIZATION TRAINING I**

8625 - Pictorial Visual Rotation Ability of Engineering Design Graphics Students .....	5212
<i>J. Ernst, D. Lane, A. Clark</i>	
8768 - Spatial Ability Measurement in an Introductory Graphic Communications Course .....	5220
<i>W. Kelly Jr., T. Branoff, A. Clark</i>	
9247 - Using Touch Interface Technology for Spatial Visualization Trainin .....	5234
<i>L. Einde, N. Deison</i>	
9262 - Relationship Between Students' Spatial Visualization Ability and their Ability to Create 3D Constraint-Based Models from Various Types of Drawings .....	5246
<i>T. Branoff, M. Dobelis</i>	

### **M531 – INTEGRATING ENGINEERING ECONOMY INTO CURRICULA**

8581 - Engineering Economics as a General Education Course to Expand Quantitative and Financial Literacy .....	5260
<i>J. Wilck Iv, P. Lynch, P. Kauffmann</i>	

## VOLUME 7

9980 - A Cross-Discipline, Project-Based Approach to Teaching Engineering Economy .....	5271
<i>H. Leblanc, B. Boulanger</i>	
8760 - Integrating Economic Analysis into Capstone Design .....	5292
<i>G. Dixon, J. Wilck Iv</i>	
8909 - Case Study Application of After Tax Analysis to a Renewable Energy Project .....	5301
<i>C. Barboza</i>	

### **M532 – ETHICAL BEHAVIOR IN ACADEMIA AND BEYOND**

8413 – Predatory Online Technical Journals: A Question of Ethics .....	5312
<i>M. Dyrud</i>	
8396 - Textual Appropriation and Attribution in Engineering Theses and Dissertations: An Exploratory Study .....	5328
<i>E. Eckel</i>	
9566 - Academic Misconduct - What Students Think and a Few Case Studies .....	5344
<i>A. Khalid, B. Stutzmann, M. Lowder, M. Atiqullah, R. Singh, C. Chin</i>	

### **M535 – MEASURING IMPACT: LIBRARIES, LIBRARIANS, INSTRUCTION, AND INSTITUTIONS**

8588 - (In)Visible Me? An Empirical Study of Engineering Librarian Online Profiles .....	5365
<i>M. White</i>	
10863 - The CARE (Center for Academic Resources in Engineering) Program at Illinois .....	5375
<i>W. Mischo, I. Favila, D. Tempel, E. Cabada</i>	
8614 - The Writing Style of Predatory Publishers .....	5399
<i>D. Markowitz, J. Powell, J. Hancock</i>	
10718 - Content Analysis of Engineering LibGuides .....	5422
<i>N. Osorio</i>	

### **M539A – CURRICULUM & STUDENT ENROLLMENT II**

8814 - Correlating Course Attendance with Factors of First-Generation Status, Gender, and Economic Status .....	5445
<i>J. Durfee, W. Loendorf, D. Munson, D. Richter, T. Geyer, M. Weiser, N. Hossain, H. Saad</i>	
9532 - Unleashing Student Creativity with Digital Design Patterns .....	5458
<i>M. Bazdresch</i>	
10562 - The Importance of a Thriving Student Organization for a Nonresidential College Campus .....	5464
<i>J. White, V. Ray, D. Koo</i>	

### **M539B – CAPSTONE & SENIOR DESIGN PROJECTS**

8476 - EET Capstone Student Project: Chemical Mixing Plant Integrated with Programmable Logical Controller and Human Machine Interface .....	5473
<i>A. Sergeev, N. Alaraje, Q. Parnell, T. Aldulaijan, K. O'Conner</i>	

<b>8715 - NASA Wireless Smart Plug: A Successful ESET Capstone Design Project</b> .....	5488
<i>J. Morgan, J. Porter, K. Rojdev, D. Carrejo, A. Colozza</i>	
<b>10817 - A Senior Design Project: Heating and Cooling System for Car's Interior</b> .....	5503
<i>E. Rios, A. Khan, D. Padgett</i>	
<b>10957 - Implementing Mechatronics Design Methodology in Mechanical Engineering Technology Senior Design Projects at the Old Dominion University</b> .....	5515
<i>V. Jovanovic, J. Michaeli, O. Popescu, M. Moustafa, M. Tomovic, A. Verma, C. Lin</i>	

### **M539C – DISTANCE LEARNING IN ENGINEERING TECHNOLOGY**

<b>8569 - Hands-on Homework or Laboratory Development for Distance Learning Students in Programmable Logical Controller (PLC)</b> .....	5526
<i>C. Lin, Y. Shen, M. Tomovic</i>	
<b>8904 - Delivery of Hands-on Technical Courses through Real-Time Distance Learning</b> .....	5538
<i>S. Hsiung, J. Ritz, E. Yaprak, F. Jao</i>	
<b>9130 - Student Engagement Online - Does Gender Make a Difference? A Pilot Study in One Engineering and Technology Course</b> .....	5547
<i>A. Hitson-Stone, J. Little-Wiles, E. Fernandez, P. Fox</i>	
<b>9145 - Implementing Telecommunication's Switching and Routing Laboratory Practices: Migration to a Distance Learning based Instruction</b> .....	5557
<i>R. Chinchilla, O. Idowu, T. Macmullen</i>	
<b>10320 - Substitution of Lectures in Applied Statics Course With “Open Learning Initiative” Web Resources</b> .....	5570
<i>B. Alenskis</i>	

### **M540A – ENTREPRENEURSHIP & ENGINEERING INNOVATION EDUCATION SESSION 3**

<b>8732 - Leveraging University Entrepreneurship Center Programs as a Means to Enrich Engineering Education</b> .....	5578
<i>T. Vandegrift, J. Down</i>	
<b>8802 - Developing Creativity Competency of Engineers</b> .....	5597
<i>P. Waychal</i>	
<b>8936 - Teamwork, Innovation, and Student Engagement in Technology Entrepreneurship - A Case Study</b> .....	5612
<i>A. Joseph</i>	
<b>8995 - Recent Graduates Perspectives on Innovation and Entrepreneurship and the Creation of New Entrepreneurship Course</b> .....	5630
<i>N. Bousaba, J. Conrad</i>	

### **M541 – ENVIRONMENTAL ENGINEERING PEDAGOGY AND INNOVATION**

<b>8673 - Online Modules Enable Prerequisite Review and Mastery During Design Courses</b> .....	5643
<i>S. Velegol, S. Zappe, M. Brannon</i>	
<b>8972 - Assessing Student Writing Competencies in Environmental Engineering Courses</b> .....	5656
<i>P. Parker, B. Bocher, A. Polebitski</i>	
<b>9692 - Integrating Environmental Engineering and Sustainability into Engineering Science and General Engineering Programs</b> .....	5668
<i>B. Read-Daily</i>	

### **M542 – FPD 3: RETENTION**

<b>10749 - Impacting First Year Engineering Retention</b> .....	5678
<i>S. Steadman, G. Jefferson, T. Thomas, K.-T. Hsiao</i>	
<b>9756 - First-Year Student Persistence and Retention Influenced by Early Exposure to Engineering Practitioners Co-Teaching Entry-Level Courses: A Four-Year Indirect Assessment</b> .....	5685
<i>P. Sable, S. Karackattu, M. Traum</i>	
<b>9648 - Increasing Retention of Under-represented Minority Students in Engineering: The Diversity Programs Office - Scholars Program (DPO-SP)</b> .....	5698
<i>C. Vergara, T. Caldwell, J. Sticklen, S. Sivakumar, K. Foster, T. Lane, R. Caldwell Jr., L. Henry</i>	
<b>8753 - First Year Engineering Courses Effect on Retention and Student Engagement</b> .....	5711
<i>G. Bucks, K. Ossman, J. Kastner, F. Boerio, J. Torsella</i>	

### **M543 – PREPARING FUTURE EDUCATORS**

<b>10873 - Preparing Future Engineering Educators through Round-Table Practicum Course Discussions</b> .....	5721
<i>S. Kusano, H. Murzi, P. Shekhar, T. Kinoshita, C. Seimetz, R. Goff, D. Basu</i>	
<b>8691 - Applying Research-based Principles and Theory to Practice: The Redesign of a Graduate Student Instructor Seminar</b> .....	5730
<i>M. Brannon</i>	

<b>9165 - Graduate Student and Faculty Member: An Exploration of Career and Personal Decisions</b> .....	5749
<i>R. McCord, C. Hixson, E. Ingram, L. McNair</i>	
<b>9815 - Translational Engineering Skills Program (TESP): Training Innovative, Adaptive, and Competitive Graduate Students for the 21st Century Work Force</b> .....	5765
<i>E. Veety, M. Ozturk, R. Engel, C. Vallas, M. Manfra</i>	
<b>9708 - Training for Student Teaching Fellows at Rowan University</b> .....	5779
<i>L. Head, M. Basantis, S. Chin, B. Pietrucha</i>	

**M546 – INTERNATIONAL DIVISION TECHNICAL SESSION 1**

<b>8503 - A New Vision for Engineering Education</b> .....	5790
<i>H. Parsaei, N. Elbashir</i>	
<b>9681 - iPodia - “Classroom-without-Borders” Global Engineering Education</b> .....	5798
<i>A. Liu, S. Lu, G. Ragusa</i>	

**M547 – K 12 ENGINEERING RESOURCES: BEST PRACTICES IN CURRICULUM DESIGN, PART 1 OF 2**

<b>8488 - Using Teacher Feedback to Improve the Design of a Fourth Year High School Mathematics Curriculum</b> .....	5821
<i>S. Hahler, K. Corbett</i>	
<b>9254 - STEM High School: Does Multiple Years of High School Engineering Impact Student Choices and Teacher Instruction?</b> .....	5832
<i>M. Zarske, M. Gallipo, J. Yowell, D. Reamon</i>	
<b>10493 - A Standards-based Tool for Middle School Teachers to Engage Students in STEM Fields</b> .....	5849
<i>S. Bakrania, K. Bhatia, K. Jahan</i>	

**M548B – INTEGRATING ENGINEERING & LIBERAL EDUCATION**

<b>8495 - Engineers Can Interact in a Liberal Arts World</b> .....	5860
<i>P. Hylton, W. Otoupal-Hylton</i>	
<b>9561 - Fostering 21st Century Skills in Engineering Undergraduates through Co-Curricular Involvement</b> .....	5871
<i>D. Fisher, A. Baglioni, S. Sarma</i>	
<b>9995 - What's Wrong with Evidence? Epistemological Roots and Pedagogical Implications of “Evidence-based Practice” in STEM education</b> .....	5881
<i>D. Riley</i>	
<b>10028 - Torquing Engineering: Historical and Contemporary Challenges to the Technical Core via Internationalization</b> .....	5890
<i>B. Jesiek</i>	

**M549 – PROGRAM AND CURRICULUM DESIGN INITIATIVES**

<b>9231 - Redesigning an Online Executive Master's Class for a Large Number of Students</b> .....	5901
<i>M. Natarajathinam</i>	
<b>9268 - A Statewide Initiative for Manufacturing Day in Florida</b> .....	5910
<i>M. Barger, R. Gilbert, M. Boyette, D. Bagley</i>	
<b>10151 - A Longitudinal Study on the Effectiveness of the Research Experience for Undergraduates (REU) Program at Missouri University of Science and Technology</b> .....	5918
<i>H. Sheng, R. Landers, F. Liu, T. Nguyen</i>	
<b>10246 - Lessons in Manufacturing Education for the U.S. from Austria's Dual-Track Education System</b> .....	5939
<i>V. Hill</i>	
<b>10025 - Freshmen Engineering Course in an Oil &amp; Gas University</b> .....	5959
<i>J. Mohammed</i>	

**M551 – THE USE OF GAMES AND UNIQUE TEXTBOOKS IN MATHEMATICS EDUCATION**

<b>8400 - NCAA Basketball Tournament Analysis for High School Mathematics</b> .....	5969
<i>A. Lee, S. Jacobson, W. Cragoe</i>	
<b>9778 - A Study of Pre-Algebra Learning in the Context of a Computer Game-Making Course</b> .....	5980
<i>E. Shaw, J. Kim, Z. Xing</i>	
<b>8415 - Work in Progress: Methods Implemented by a Non-Traditional Textbook to Enable Student Success in Engineering</b> .....	5988
<i>D. Reeping, K. Reid</i>	

**M552 – THERMODYNAMICS, FLUIDS AND HEAT TRANSFER I**

<b>9321 - Optimization of Vapor Compression Cycles</b> .....	6000
<i>D. Zietlow</i>	

<b>9735 - Building a Foundation: Tools for Accentuating the First Law in an Introductory Thermodynamics Course</b> .....	6023
<i>N. Smith, B. Field</i>	
<b>10002 - Challenges and Evolution of Combined and Separate Thermodynamics Courses in a Mechanical Engineering and Mechanical Engineering Technology Program</b> .....	6032
<i>M. Weiser, H. Saad, R. Gerlick</i>	
<b>10227 - Redesigning the First Course of Thermodynamics to Improve Student Conceptualization and Application of Entropy and Second Law Concepts</b> .....	6041
<i>T. Jacobs, J. Caton, J. Froyd, K. Rajagopal</i>	

### **M552B – ME CURRICULUM AND ASSESSMENT**

<b>8462 - The Goldilocks Continuum: Making the Case for an Optimal Balance of Instructional Strategy in Mechanical Engineering Collaborative Learning</b> .....	6058
<i>C. Larsen, R. Marra, N. Tang, D. Jonassen, R. Winholtz</i>	
<b>9074 - Embedded Learning Modules for the Mechanical Engineering Curriculum</b> .....	6074
<i>F. Khan, K. Singh</i>	
<b>9874 - Curriculum Revision to Better Integrate Mechanical Engineering Science and Practice in the 2nd and 3rd Undergraduate Years</b> .....	6084
<i>M. Miller, J. Allen, J. Bough, J. Clerck, W. Endres, S. Miers, I. Miskioglu, G. Odegard, C. Karsen, P. Susante</i>	
<b>10268 - Concurrent Offering of Online and Face-to-Face Courses: Synergies and Challenges</b> .....	6093
<i>H. Shapiro, G. Starns</i>	

### **M553 – TEACHING DYNAMICS**

<b>9243 - Developing Web-Assisted Learning Modules in Vector Dynamics</b> .....	6104
<i>P. Nissenson, J. Seong, C. Chen, P. Dashner, A. Shih</i>	
<b>9969 - Development and Assessment of an Inquiry-Based Learning Activity in Dynamics: A Case Study in Identifying Sources and Repairing Student Misconceptions</b> .....	6113
<i>J. Widmann, B. Self, M. Prince</i>	
<b>10519 - Sustainable Reform of "Introductory Dynamics" Driven by a Community of Practice</b> .....	6128
<i>M. West, G. Herman</i>	
<b>10536 - Transfer Effects of Challenge-based Lessons in an Undergraduate Dynamics Course</b> .....	6140
<i>M. Lovell, S. Brophy</i>	

## VOLUME 8

<b>10820 - Learning Engineering Dynamics with a Videogame: A Look at How Students Play the Game</b> .....	6156
<i>B. Collier</i>	

### **M554 – BEYOND STUDENTS: ISSUES OF UNDERREPRESENTATION AMONG PARENTS AND PROFESSIONALS**

<b>10837 - Women of Color Engineering Faculty: An Examination of the Experiences and the Numbers</b> .....	6179
<i>C. Berry, M. Cox, J. Main</i>	
<b>8815 - Career Self-efficacy of the Black Engineer in the U.S. Government Workplace</b> .....	6192
<i>S. Hofacker</i>	
<b>10785 - Transformation of Faculty Dissemination Practices Via Social Media</b> .....	6217
<i>M. Cox, P. Brunson, N. Sambamurthy, S. Branch, C. Berdanier</i>	
<b>10559 - A Engineering Discipline Awareness Workshop for Pre-Service STEM Teachers</b> .....	6231
<i>F. Gonzalez, G. Pinzon, A. Gupta, P. Biswas</i>	
<b>8457 - A Comprehensive Model for Motivating and Preparing Under-represented Students, Educators and Parents in Science, Engineering and Technology</b> .....	6254
<i>A. Ortiz</i>	

### **M555 – MULTIDISCIPLINARY PROGRAMS AND CURRICULA**

<b>9267 - Electric Power Systems Education for Multidisciplinary Engineering Students</b> .....	6273
<i>A. Cramer, L. Holloway</i>	
<b>9238 - Professional Profiles and Multidisciplinary Engineering Curriculum</b> .....	6286
<i>M. Botero, O. Duarte, C. Sarmiento, R. Perez, A. Ghisays</i>	
<b>9551 - Integration of Sustainability in a Multidisciplinary Engineering Department</b> .....	6301
<i>J. Fraser, L. Bedoya-Valencia, J. Depalma, N. Jaksic, A. Paudel, H. Sarper, D. Yuan</i>	
<b>9803 - The Development and Introduction of a New Bachelor of Science Degree in Robotics Engineering at Lawrence Technological University: A Review of the First Two Years</b> .....	6311
<i>R. Fletcher</i>	

## **M556 – BEST OF NEE**

<b>8902 - Using Shadowing to Improve New Faculty Acclimation</b> .....	6333
<i>S. Williams, R. Hasker, S. Holland, A. Livingston, K. Widder, J. Yoder</i>	
<b>9506 - I Did Not Anticipate This: Experiences from the Early Years</b> .....	6343
<i>T. Shepard, A. Hoxie, M. Anderson</i>	
<b>8505 - People Matter: The Role of Peers and Faculty in Students' Academic Engagement</b> .....	6362
<i>M. Plett, D. Wilson, R. Bates, C. Allendoerfer, D. Jones, T. Floyd-Smith, N. Veilleux, C. Hawkinson</i>	
<b>9834 - Scaffolded Structuring of Undergraduate Research Projects</b> .....	6376
<i>D. Colbry, K. Luchini-Colbry</i>	

## **M561 – ENGINEERING PHYSICS & PHYSICS DIVISION TECHNICAL SESSION 2**

<b>8833 - A Comparison of Student Misconceptions in Rotational and Rectilinear Motion</b> .....	6391
<i>W. Turner, G. Ellis, R. Beichner</i>	
<b>8819 - Laboratory Exercises as an Assessment Tool in an Upper Division Electromagnetic Fields Class - Lessons Learned</b> .....	6418
<i>J. Jalkio, B. McIntyre</i>	
<b>9218 - A Versatile Platform for Programming and Data Acquisition: Excel and Visual Basic for Applications</b> .....	6425
<i>H. Evensen</i>	
<b>10451 - Student Performance Enhancements via an Active, Integrated Engineering Physics Course</b> .....	6437
<i>T. Garrison</i>	

## **M571 – INTERACTIVE PANEL ON ADVOCACY TIPS: AN INITIATIVE TO PROVIDE INDIVIDUALS THE TOOLS TO ADVOCATE FOR WOMEN AND UNDERREPRESENTED MINORITIES**

<b>9377 - Interactive Panel on Advocacy Tips: an Initiative to Provide Individuals the Tools to Advocate for Women and Underrepresented Minorities</b> .....	6451
<i>A. Minerick, R. Green, C. Bilen-Green, K. Constant, B. Holloway, S. Eksloglu, D. Gilbuena</i>	

## **M540B – THE NATURE OF INNOVATION AND ENTREPRENEURSHIP SESSION 6**

<b>8627 - Creative Go-Getters: Antecedents of Entrepreneurial Activities in Engineering Undergraduates</b> .....	6467
<i>S. Zappe</i>	
<b>8751 - The Traditional Engineer vs. The Innovative Engineer</b> .....	6482
<i>D. Ferguson, S. Purzer, M. Ohland, K. Jablockow</i>	
<b>9947 - The Innovation Competencies - Implications for Educating the Engineer of the Future</b> .....	6501
<i>W. Kline, W. Schindel</i>	
<b>10389 - Quantitative Assessment of All-Class Project-based Undergraduate Course on Graduates Career</b> .....	6530
<i>E. Salib, E. Walisko</i>	
<b>10437 - Measuring Innovative Thinking Skills in Innovation Challenge Activities</b> .....	6547
<i>C. Amelink, C. Seimetz, B. Watford, J. Cuadrado-Medina, J. Folgar-Lopez, S. Lewis</i>	
<b>9510 - Developing Cognitive Innovation Skills through a Problem Solving Approach in Science and Technology to Develop Solution Entrepreneurs</b> .....	6555
<i>J. Barnes, S. Barnes, M. Dyrenfurth</i>	

## **M717 – EMBEDDED SYSTEMS AND MOBILE COMPUTING**

<b>9485 - Bluetooth Smart Phone App for Terrain Sensing Vehicle</b> .....	6568
<i>M. Muqri, B. Lane</i>	
<b>10078 - Programming Embedded Microprocessor Systems: The Autonomous Robotic Car - Dragon Board vs Tower</b> .....	6586
<i>J. Shakib, M. Muqri</i>	
<b>8872 - Learning C Language Programming with Executable Flowchart Language</b> .....	6597
<i>C. Sehyeong, Y. Ryu, S.-K. Kim</i>	
<b>9603 - Using Open Source NoSQL Technologies in Designing Systems for Delivering Electric Vehicle Data Analytics</b> .....	6604
<i>V. Bolly, J. Springer, J. Dietz</i>	
<b>9264 - Credentialing MOOCs: A Case Study</b> .....	6613
<i>S. Brozina, D. Knight</i>	

## **M717B – TOPICS IN COMPUTING AND INFORMATION TECHNOLOGIES**

<b>8738 - Factors Influence Data Management Models Selection</b> .....	6621
<i>G. Shaykhian, M. Khairi</i>	



<b>8426 - Data Loss Prevention Management in Healthcare Enterprise Environments</b> .....	6633
<i>M. Tu, K. Spoa-Harty</i>	
<b>8958 - Automatic Generation of SQL Queries</b> .....	6644
<i>Q. Do, R. Agrawal, D. Rao, V. Gudivada</i>	
<b>8737 - Centralized Or Federated Data Management Models, IT Professionals' Preferences</b> .....	6655
<i>G. Shaykhian, M. Khairi</i>	
<b>8993 - Execution of Remote Laboratory with Learning Management System</b> .....	6668
<i>A. Azad, N. Siripragada</i>	
<b>10184 - An Exploratory Survey on User Perceptions and Adoption of NEES.org</b> .....	6686
<i>M. Taleyarkhan, O. Alabi, A. Magana, T. Hacker</i>	

### **M726B – PROJECTS IN ECE**

<b>8773 - Promoting Undergraduate Research in the Electrical Engineering Curriculum</b> .....	6698
<i>D. Hoe</i>	
<b>8957 - High Altitude Radiation Detector (HARD): An Exemplary Means to Stimulate Electrical and Computer Engineering Undergraduate Research</b> .....	6711
<i>W. Lee, N. Conklin</i>	
<b>10043 - UnLecture: A Novel Active Learning Based Pedagogical Strategy for Engineering Courses</b> .....	6724
<i>V. Subbian, C. Purdy, F. Beyette Jr.</i>	
<b>10627 - A Speech Quality and Intelligibility Assessment Project Using Google Voice</b> .....	6733
<i>Y. Yu</i>	

### **M728 – ENGINEERING AND PUBLIC POLICY DIVISION TECHNICAL SESSION 2**

<b>8689 - Higher Technological Education and British Polict Making: A Lost Opportunity for Curriculum Change in Engineering Education</b> .....	6744
<i>J. Heywood</i>	
<b>9114 - Efficiency Measure for Colleges of Engineering</b> .....	6769
<i>D. Malzahn, L. Whitman, A. Katamjani</i>	
<b>9135 - A Model for Realizing Human Potential</b> .....	6783
<i>D. Kazmer, B. Tucker, E. Hajduk</i>	

### **M739A – ETAC, ABET, & STEM PROGRAMS**

<b>9236 - Engineering Technology Workplace Competencies Provide Framework for Evaluation of Student Internships and Assessment of ETAC of ABET Program Outcomes</b> .....	6795
<i>C. Balascio</i>	
<b>9653 - Adapting the VALUE Rubrics to ABET ETAC Outcomes a-k</b> .....	6806
<i>E. Cooney</i>	
<b>8506 - Expand the Pipeline: K-12 Curriculum Development on VHDL and FPGA Design</b> .....	6827
<i>N. Alaraje, A. Sergeev</i>	
<b>8696 - The RepRap 3-D Printer Revolution in STEM Education</b> .....	6834
<i>J. Irwin, J. Pearce, G. Anzalone, D. Oppliger</i>	
<b>9593 - Growing a STEM Initiative: Establishing Philosophies, Identifying Needs and, Lessons Learned</b> .....	6847
<i>L. Kinsler, S. Khan</i>	

### **M739B – RENEWABLE ENERGY TOPICS**

<b>8501 - Analysis of Wind Power Generation with Application of Wind Tunnel Attachment</b> .....	6855
<i>U. Dakeev, Q. Mazumder, T. Hussain, J. Pung</i>	
<b>9186 - A Renewable Energy Specialization in an Electronics Engineering Technology Curriculum</b> .....	6863
<i>W. Phillips, W. Sullivan, R. Aron, A. Cherif, S. Fortun</i>	
<b>10552 - Low Power Energy Harvesting with a Thermoelectric Generator through an Air Conditioning Condenser</b> .....	6873
<i>F. Yildiz, K. Coogler</i>	
<b>9029 - Designing Hybrid Energy Storage Systems: A Tool for Teaching System-Level Modeling and Simulation</b> .....	6885
<i>B. Ray</i>	

### **M739C – ROBOTICS AND AUTOMATION**

<b>8470 - Effectiveness of Blended Teaching of Electrical Machinery Course</b> .....	6904
<i>A. Sergeev, N. Alaraje</i>	
<b>9272 - RFID Reader System Project</b> .....	6917
<i>D. Loker, S. Strom</i>	
<b>9645 - A Collaborated Process with a Wireless Autonomous Vehicle at its Center</b> .....	6927
<i>T. Stout, S. Hsiung</i>	

<b>10101 - An Autonomous Arduino-based Racecar for First-Year Engineering Technology Students</b> .....	6934
<i>W. Rosen, Y. Ertekin, M. Carr</i>	

**M740 – ENTREPRENEURSHIP & ENGINEERING INNOVATION PROGRAMS AND COURSES SESSION 5**

<b>10373 - The Design of a Graduate Level Course in Entrepreneurship: Ownership Issues</b> .....	6945
<i>P. Samson</i>	
<b>9360 - Development and Implementation of the Industrial and Entrepreneurial Engineering Program at Western Michigan University</b> .....	6953
<i>A. Houshyar, B. White, S. Butt, T. Fredericks</i>	
<b>9554 - Engineers, Entrepreneurs and Innovation at a Liberal Arts University</b> .....	6963
<i>M. Bates, D. Takehara, H. Voss</i>	
<b>9787 - Innovative STEM-Preneur Learning Modules for Freshman Robotic Engineering Class</b> .....	6986
<i>Y. Xu, H. Li, K. Jin</i>	
<b>10011 - Biassociation for the Entrepreneurial Engineering Curriculum</b> .....	6995
<i>F. Lorca, S. Condoor</i>	
<b>10070 - Combining Technical and Entrepreneurial Skills in an Electric Circuits Course through Project-Based Learning</b> .....	7000
<i>H. Leblanc, K. Al-Olimat, F. Hassan, N. Alsbou</i>	

**M754 – DIVERSITY REDEFINED: NONTRADITIONAL VIEWS IN TRADITIONAL ENVIRONMENTS**

<b>10272 - A Teaching Model for Teaching Deaf/Hard of-hearing and Hearing Students with Course Accessibility and Real World Product Design</b> .....	7014
<i>G. Behm, A. Mondragon</i>	

**VOLUME 9**

<b>10041 - Dialogue of Innovation: Did you come to See or did you come to Stay?</b> .....	7027
<i>R. Harris, L. Machunis, W. Tita</i>	
<b>9857 - A Philosophy of Learning Engineering and a Native American Philosophy of Learning; An Analysis for Congruency</b> .....	7040
<i>C. Foster, S. Jordan</i>	
<b>8440 - Measuring the Educational Benefits of Diversity in Engineering Education: A Multi-Institutional Survey Analysis of Women and Underrepresented Minorities</b> .....	7066
<i>T. Strayhorn, L. Long III, M. Williams, M. Dorime-Williams, D. Tillman-Kelly</i>	
<b>10872 - Keeping up With Technology: Transitioning Summer Bridge to a Virtual Classroom</b> .....	7081
<i>K. Brinkley, F. Rankins, S. Clinton, R. Hargraves</i>	

**M768 – PROMOTING TECHNOLOGICAL LITERACY**

<b>8690 - Designing a Stage of "Romance" for Programs in Technological Literacy</b> .....	7095
<i>J. Heywood</i>	
<b>10297 - Large Research Center Education and Outreach: Lessons from 5 years of Distributed Collaborative Design, Development and Implementation</b> .....	7108
<i>S. Brophy, T. Anagnos</i>	
<b>10840 - Development of a Simplified Method for Representing Technological Systems for Non-Engineers</b> .....	7126
<i>J. Krupczak, L. Aprill, D. Langholz</i>	
<b>9187 - An Intuitive Approach to Teaching concepts in Engineering to a General Audience</b> .....	7148
<i>D. Raviv, G. Roskovich</i>	

**T103 – STRUCTURAL EDUCATION TOPICS IN ARCHITECTURAL ENGINEERING**

<b>9050 - Structural Engineering for Architecture and Construction Management Students - A New Approach</b> .....	7173
<i>J. Guthrie, P. Brady</i>	
<b>9220 - Perceptions Regarding Cheating among CM and AEC Students</b> .....	7184
<i>G. Banik</i>	
<b>10134 - Introduction to Architectural Structures: Lessons Learned from Parti Pris Pedagogy</b> .....	7192
<i>K. Hedges</i>	
<b>9826 - Using K'nex to Teach Large Scale Structures to Architects and Construction Students</b> .....	7207
<i>A. Estes, C. Baltimore</i>	

## **T110 – RESEARCH IN BIOMEDICAL PEDAGOGY**

<b>9737 - Introduction of Active Learning Techniques Increases Student Learning in a Systems Physiology Laboratory Course</b> .....	7220
<i>R. Ramos</i>	
<b>9070 - Graduate Internship/Externship Experiences in NIBIB Funded Graduate Training Programs</b> .....	7229
<i>M. Cousins, M. Markey</i>	
<b>9731 - Similarities and Differences in Undergraduate Biomedical Engineering Curricula in the United States</b> .....	7245
<i>D. Gatchell, R. Linsenmeier</i>	
<b>8871 - Open-source Software in Biomedical Education: from Tracking to Modeling Movements</b> .....	7259
<i>J. Papich, C. Kennett, D. Piovesan</i>	

## **T113 – RESEARCH EXPERIENCE IN STORM WATER MANAGEMENT**

<b>8598 - Expanding the Presence of Stormwater Management in Undergraduate Civil Engineering</b> .....	7269
<i>A. Navickis-Brasch, N. Bormann, S. Niezgod, M. Zarecor</i>	
<b>9178 - Experiences in Implementing an NSF/REU Site on Interdisciplinary Water Sciences and Engineering during 2007-13</b> .....	7285
<i>V. Lohani</i>	
<b>10709 - Insights and Challenges in Developing a Remote Real-Time Watershed Monitoring Lab</b> .....	7299
<i>W. McDonald, R. Dymond, V. Lohani, D. Brogan</i>	
<b>10710 - Integrating a Real-Time Remote Watershed Monitoring Lab into Water Sustainability Education</b> .....	7314
<i>W. McDonald, R. Dymond, V. Lohani, D. Brogan, R. Clark Jr.</i>	

## **T116 – COMPUTING IN THE FIRST YEAR**

<b>10752 - First Year Engineering Summer Session</b> .....	7328
<i>S. Steadman</i>	
<b>10270 - Design of a Full-Featured Robot Controller for Use in a First-Year Robotics Design Project</b> .....	7339
<i>M. Vernier, P. Wensing, C. Morin, A. Phillips, B. Rice, K. Wegman, C. Hartle, P. Clingan, K. Kecskemeti, R. Freuler</i>	
<b>10103 - e-Learning: Teaching Computer Programming Online to First Year Engineering Students</b> .....	7360
<i>L. Santiago</i>	
<b>9385 - Comparing Student Performance on Computer-Based vs. Paper-Based Tests in a First-Year Engineering Course</b> .....	7368
<i>M. Ita, K. Kecskemeti, K. Ashley, B. Morin</i>	

## **T123 – DESIGN REALIZATION**

<b>9232 - An Activity in Design for Manufacturability - Concept Generation Through Volume Production in Less Than Three Hours</b> .....	7382
<i>P. Leisher, S. Kirkpatrick, R. Liptak, S. Granieri, R. Bunch</i>	
<b>9085 - Enhancing Design Students' Comfort and Versatility in the Shop: A Project-Based Approach</b> .....	7391
<i>A. Epstein, S. Rudolph, H. Einstein, P. Reis</i>	
<b>8886 - Exploring the Impact of Cognitive Style and Academic Discipline on Design Prototype Variability</b> .....	7430
<i>K. Jablolkow, K. Spreckelmeyer, J. Hershfield, M. Hershfield, C. McEachern, M. Steinert, L. Leifer</i>	
<b>9025 - Virtual or Physical Prototypes? Development and Testing of a Prototyping Planning Tool</b> .....	7443
<i>C. Hamon, M. Green, B. Dunlap, B. Camburn, R. Crawford, D. Jensen</i>	
<b>10205 - An Ethos of Sharing in the Maker Community</b> .....	7459
<i>C. Foster, M. Lande, S. Jordan</i>	

## **T125 – PEDAGOGY AND LEARNING 1**

<b>10189 - Developing a Learner-Centered Classroom Through Collaborative Knowledge Building</b> .....	7467
<i>G. Ellis, H. Ipesa-Balogun, Y. Yu, Y. Zhang, X. Jiang</i>	
<b>9475 - Probing the Inverted Classroom: A Controlled Study of Teaching and Learning Outcomes in Undergraduate Engineering and Mathematics</b> .....	7482
<i>N. Lape, R. Levy, D. Yong, K. Haushalter, R. Eddy, N. Hankel</i>	
<b>9597 - A Study of Feedback Provided to Student Teams Engaged in Open-Ended Projects</b> .....	7503
<i>L. Hirshfield, J. Whinnery, D. Gilbuena, M. Koretsky</i>	
<b>8718 - On Implementation of Classroom-Based Pedagogies of Engagement: Relevant Measures and General Outcomes</b> .....	7526
<i>W. Akili</i>	

## **T125B – TRENDS IN ENGINEERING EDUCATION 2**

<b>10242 - The Evolution of Tactile and Digital Learning Preferences in Undergraduate Engineering Education</b> .....	7538
<i>C. Tucker, K. Jackson, L. Schmidt, G. Kremer, P. Yin</i>	

<b>10754 - Conducting Virtual Focus Groups to Identify How Rewards Have Affected the Valuation of Technology in Engineering Education</b> .....	7554
<i>F. McMartin, S. Holsted, J. Morrill, J. Tront</i>	
<b>10353 - Gathering and Synthesizing Information During the Development of User Requirements and Engineering Specifications</b> .....	7568
<i>I. Mohedas, S. Dab, K. Sienko</i>	
<b>9464 - Student Learning Outcomes: Effectively Satisfying Multiple Accreditation Requirements</b> .....	7577
<i>G. Lennon, J. Ochs, D. Brown</i>	
<b>9524 - Expert Innovators and Innovation Education: Mental Models in Practice</b> .....	7597
<i>E. Fisher, I. Nair, M. Biviji</i>	

### **T126 – INNOVATIONS IN ELECTRICAL ENGINEERING COURSES**

<b>8816 - A Partial Flip, A Whole Transformation: Redesigning Sophomore Circuits</b> .....	7609
<i>T. Swift, B. Wilkins</i>	
<b>9393 - Introducing Angular Plane Wave Spectrum Concepts and Applications in an Undergraduate Communications Course</b> .....	7623
<i>R. Pieper, W. Wondmagegn</i>	
<b>9657 - “increasing Students' Conceptual Understanding of AC Circuits: An Application of Licht's Model”</b> .....	7646
<i>N. Pitterson, R. Streveler</i>	
<b>9179 - An Intuitive Approach to Teaching Key Concepts in Control Systems</b> .....	7655
<i>D. Raviv, G. Roskovich</i>	

### **T127 – ELECTRICAL ENERGY COURSES LABS AND PROJECTS**

<b>8953 - Synchronous Machine Winding Layout &amp; Flux Animation Tool</b> .....	7687
<i>H. Hess, B. Johnson, C. Chapman</i>	
<b>10018 - Educational Approach to the Methodology of Implementing Wireless Control of Power Flow in Hybrid Power Systems</b> .....	7708
<i>T. Ma, O. Mohammed, B. Serrano</i>	
<b>10584 - New Trends and Technologies in Power Electronics and Motor Drives Education</b> .....	7723
<i>Y. Alsmadi, K. Tsai, M. Scott, L. Xu, A. Wang</i>	
<b>9255 - Residential Battery Energy Storage Systems (BESS) Modeling and Effect on the Smart Grid from the Classroom Point of View</b> .....	7742
<i>N. Cheeweewattanakoon, G. Kaur, N. Chawla</i>	

### **T132 – EVALUATION OF ETHICAL DEVELOPMENT**

<b>9919 - Ethical Climate in Multidisciplinary Teams: Development of the TECS</b> .....	7758
<i>J. May, A. Mead, J. Ellington</i>	
<b>10060 - The Development of an Instrument for Assessing Individual Ethical Decisionmaking in Project-based Design Teams: Integrating Quantitative and Qualitative Methods</b> .....	7770
<i>Q. Zhu, C. Zoltowski, M. Feister, P. Buzzanell, W. Oakes, A. Mead</i>	
<b>10414 - Using the EPSA Rubric to Evaluate Student Work in a Senior Level Professional Issues Course</b> .....	7782
<i>E. Schmeckpeper, A. Kranov, S. Beyerlein, J. McCormack, P. Pedrow</i>	

### **T139 – SIMULATIONS AND PROJECT BASED LEARNING I**

<b>8724 - Desktop VR Centered Project Based Learning in ET Courses Using a Low-cost Portable VR System</b> .....	7801
<i>M. Chandramouli, G. Takahashi, G. Bertoline</i>	
<b>8984 - Using Course Projects to Infuse Innovation throughout the Undergraduate Experience in the Engineering and Engineering Technology Curriculum</b> .....	7813
<i>J. Durfee, D. Richter, M. Weiser, N. Hossain, H. Saad</i>	
<b>10861 - Strength of Materials Through Economical Activities</b> .....	7825
<i>N. Denton</i>	
<b>8867 - Defect Simulation of AL319 in Lost Foam Casting - an REU Undergraduate Research Experience</b> .....	7838
<i>A. Elsavay, M. Abdelrahman, S. Pardue</i>	

### **T140 – ENTREPRENEURSHIP & ENGINEERING INNOVATION DIVISION SESSION 7**

<b>10961 - Engineering Virtual Studio: KEEN Modules to Foster Entrepreneurial Mindset in an Integrative, First/Second Year Online Course</b> .....	7851
<i>K. Thoroughman, A. Hruschka, P. Widder</i>	
<b>10883 - Modern Engineering Sandwich: Management, Globalization and Entrepreneurship on Top of Product Development</b> .....	7859
<i>Z. Pasek, F. Schlosser</i>	

<b>10755 - Supporting Change in Entrepreneurship Education: Creating a Faculty Development Program Grounded in Results from a Literature Review</b> .....	7875
<i>S. Giersch, F. McMartin, E. Nilsen, S. Sheppard, P. Weilerstein</i>	
<b>10735 - An Implementation of Innovative Thinking in The Entrepreneurship Curriculum for Engineers</b> .....	7887
<i>S. Gandhi, D. Deardorff</i>	

## VOLUME 10

<b>10438 - Combining Discipline-specific Introduction to Engineering Courses into a Single Multi-discipline Course to Foster the Entrepreneurial Mindset with Entrepreneurially Minded Learning</b> .....	7903
<i>A. Gerhart, D. Carpenter, R. Fletcher, E. Meyer</i>	
<b>10255 - Intercollegiate Student Design Projects: Lessons Learned by Four Universities</b> .....	7933
<i>N. Rayess, B. Garner, D. Kleinke, R. Blust, W. Jordan, E. Douherty Jr.</i>	

### **T146 – INTERNATIONAL DIVISION TECHNICAL SESSION 2**

<b>8407 - The Effects of Teaching Style and Experience on Student Success in the U.S.A. and Bangladesh</b> .....	7942
<i>Q. Mazumber, K. Ahmed</i>	
<b>9869 - Managing a Required International Experience for all Undergraduate Engineering Students at a 4-Year Public University</b> .....	7953
<i>A. Morse</i>	
<b>9157 - Development of a Faculty Led Education Abroad Program and the Lessons Learned</b> .....	7964
<i>S. Acharya, L. Nutt, T. Kerzmann</i>	

### **T147 – GENDER PERCEPTIONS AND GIRLS IN K 12 ENGINEERING AND COMPUTER SCIENCE**

<b>10535 - Engineering Workshops for Middle School Girls</b> .....	7979
<i>K. Barta, B. Brinkman</i>	
<b>10311 - Changing Gender Perceptions in Elementary STEM Education</b> .....	7993
<i>E. Marasco, L. Behjat</i>	
<b>9758 - Encouraging Talented High School Girls towards a Career in Computing through a Broader Understanding of the Field</b> .....	8004
<i>S. Kumar, L. Ott</i>	
<b>9022 - The Effects of Single vs. Mixed Gender Engineering Enrichment Programs on Elementary Students' Perceptions of Engineers</b> .....	8019
<i>L. Hirsch, S. Berliner-Heyman, R. Cano, J. Carpinelli, H. Kimmel</i>	
<b>9747 - Analysis of a Short-Term STEM Intervention Targeting Middle School Girls and Their Parents (Research to Practice)</b> .....	8033
<i>C. Deckard, D. Quarfoot, K. Csanadi</i>	

### **T147B – K 12 AND PRECOLLEGE ENGINEERING CURRICULUM AND PROGRAMMING RESOURCES, PART 2 OF 2**

<b>10316 - Developing Curriculum For Introducing CyberSecurity To K-12 Students</b> .....	8075
<i>B. Morton, Y. Kim, M. Vankouwenberg, C. Lehmann, J. Ward</i>	
<b>10392 - Impact of Engineering Design Serious Game on Student Learning in a K-12 Curriculum</b> .....	8087
<i>P. Rajan, P. Raju, J. Gill</i>	
<b>8852 - Using ROVs to Teach a Blended STEM Curriculum</b> .....	8099
<i>G. Wright, K. Hacking</i>	

### **T148 - SUSTAINABILITY**

<b>8571 - The Wicked Problems in Sustainable Engineering (WPSE) Initiative: Pilot Results of a Cross-Institutional Project-Based Course Offering</b> .....	8110
<i>J. Hess, S. Brownell, A. Dale</i>	
<b>9583 - Nature/Society: Situating Student Learning Outcomes in a First-year Sustainability Studies Course</b> .....	8133
<i>J. Wilcox, A. Akera</i>	
<b>10385 - Exploring Student Sustainability Knowledge using the Structure of Observed Learning Outcomes (SOLO) Taxonomy</b> .....	8148
<i>M. Watson, J. Pelkey, M. Rodgers, C. Noyes</i>	
<b>10531 - The Grandest Challenge: Models for Communication Development in Technical Contexts</b> .....	8166
<i>J. Williams, C. Carvill, R. House, J. Livingston, A. Watt</i>	

## **T149 – LEADERSHIP, ENTREPRENEURSHIP AND ETHICS EDUCATION**

<b>8712 - Teaching Ethics and Leadership with Cases: A Bottom-up Approach</b> .....	8174
<i>D. Jennings, B. Nepal</i>	
<b>9189 - LEADERSHIP for Manufacturing and Manufacturing-related Programs</b> .....	8189
<i>R. Bennett, N. Latif, A. Sikoski, S. Wendel, M. Zahraee</i>	
<b>9304 - Development of Graduate Leadership and Management Programs for Working Professionals</b> .....	8206
<i>R. Welch, K. Plemmons</i>	
<b>9883 - Effectual Thinking: A Systematic Approach for Teaching Entrepreneurship as Part of Design and Manufacture Lab</b> .....	8221
<i>S. Sivaloganathan, R. Ganithi</i>	

## **T152 – CAPSTONE COURSES AND PROJECT BASED LEARNING**

<b>8707 - A Capstone Course in Engineering Analysis for Mechanical Engineers</b> .....	8234
<i>D. Sawyers Jr.</i>	
<b>9822 - Using an Engineering Design Center to Infuse Design Experience into a Mechanical Engineering Program</b> .....	8247
<i>V. Wilczynski, C. O'Hern, E. Dufresne</i>	
<b>10525 - Challenging Students' Values and Assumptions Through Project-Based Learning</b> .....	8261
<i>D. Bairaktarova, M. Pilotte, N. McNeill</i>	
<b>10985 - Design Projects Concurrent with Capstone Design</b> .....	8276
<i>J. Yoder</i>	

## **T154 – ENHANCING THE UNDERREPRESENTED STUDENT EXPERIENCE**

<b>10115 - Effects of Language on CATS Performance</b> .....	8282
<i>C. Mazak, C. Font-Santiago, A. Santiago-Roman</i>	
<b>9514 - Intervention to Improve Self-Efficacy and Sense of Belonging of First-Year Underrepresented Engineering Students</b> .....	8294
<i>K. Jordan, S. Sorby</i>	
<b>9037 - Enhancing Undergraduate Civil Engineering Opportunities for Minority, Female, and Socioeconomically Disadvantaged Students</b> .....	8328
<i>W. Davis, K. Bower, R. Welch, E. Connor</i>	
<b>9831 - A STEM Transfer and Retention Program at Texas A&amp;M International University</b> .....	8341
<i>F. Gonzalez, G. Pinzon</i>	
<b>8533 - Exploring and Developing Hispanic STEM Education in West Texas</b> .....	8357
<i>A. Hunt, P. Lockwood, E. Hunt</i>	

## **T171 – WIED: STRATEGIES BEYOND THE CLASSROOM**

<b>8538 - Oral Histories of Distinguished Female Leaders: Inspiring the Next Generation of Young People in Science, Technology, Engineering, and Mathematics (STEM)</b> .....	8371
<i>K. Irvin, E. Hiteshue, M. Lanzerotti, S. Hochheiser, M. Geselowitz</i>	
<b>8519 - Implementation of a Sexual Harassment Workshop Targeting Female Engineers</b> .....	8388
<i>L. Volpatti, C. Bodnar, L. Byland</i>	
<b>9248 - Living, Learning, and Staying: The Impact of a Women in Engineering Living and Learning Community</b> .....	8398
<i>C. Samuelson, E. Litzler, C. Staples, P. Smith, C. Amelink</i>	
<b>9215 - How Students' Informal Experiences Shape their Views of Engineering and Affect their Plans for Professional Persistence</b> .....	8419
<i>K. Meyers, L. McWilliams, C. Pieronek</i>	
<b>10147 - Student-led Mentoring Program Fostering Retention of Female Undergraduate Students in STEM Fields</b> .....	8450
<i>R. Perez-Castillejos, P. Santhanam</i>	

## **T202 – AEROSPACE DIVISION TECHNICAL SESSION 2**

<b>8797 - Implementing Problem-based Learning Projects to Synthesize Feedback Controllers Using Matlab/simulink and Students Assessment</b> .....	8457
<i>R. Sharma, A. Nagchaudhuri</i>	
<b>10474 - Teaching Students Science and Engineering with High Altitude Balloons and ChipKits</b> .....	8472
<i>M. Nelson</i>	
<b>10968 - Integration of Alternative Fuels and Turbine Research in an Undergraduate Classroom</b> .....	8477
<i>N. Yilmaz, K. Benalil, F. Vigil</i>	

## **T203 – CONSTRUCTION EDUCATION TOPICS IN ARCHITECTURAL ENGINEERING**

<b>10264 - Home Experiments: EarthBag Construction as Teaching Tool in Rwanda</b> .....	8487
<i>Y. Sho</i>	
<b>9987 - Changing the Course Design to Include Habitat for Humanity Improved Course Outcomes and Broadened Student's Perceptions of Community Service</b> .....	8502
<i>L. Leach</i>	
<b>10521 - Design and Diagnostic Problem-solving Approaches - Application to Thermal Comfort and Indoor Air Quality</b> .....	8514
<i>A. Megri</i>	

## **T212 – DESIGN, CREATIVITY AND CRITICAL THINKING IN THE CHEMICAL ENGINEERING CURRICULUM**

<b>9920 - Conducting Project-based Learning with a Large Chemical Engineering Freshman Cohort Using LEGO NXT Robotics</b> .....	8530
<i>B. Elmore</i>	
<b>8787 - A Creative Experience for Chemical, Food, and Environmental Engineering Students in a Material Balances Course</b> .....	8543
<i>S. Husted, N. Ramirez-Corona, A. Lopez-Malo, E. Palou</i>	
<b>8528 - Examining the Entrepreneurial Mindset of Senior Chemical Engineering Students as a Result of Exposure to the Epistemic Game “Nephrotex”</b> .....	8557
<i>K. Rogy, C. Bodnar, R. Clark</i>	
<b>9472 - Mitigating Chemical Engineering Design Team Miscommunications with Knowledge of Myers-Briggs Type</b> .....	8569
<i>K. Trenshaw, T. Vogel</i>	
<b>10287 - Development of Drug Delivery Elective for Chemical Engineers</b> .....	8588
<i>C. Anderson</i>	

## **T213 – GLOBAL PERSPECTIVE AND EXPERIENTIAL LEARNING IN CIVIL ENGINEERING**

<b>9039 - A Qualitative Study to Assess the Learning Outcomes of a Civil Engineering Service Learning Project in Bolivia</b> .....	8595
<i>A. Jeffers, P. Beata, B. Strassmann</i>	
<b>8762 - The Role of Civil Engineering in Internationalization Efforts at Villanova University</b> .....	8607
<i>A. Welker, S. Park, S. Mackey-Kallis</i>	
<b>9137 - Benefits and Practical Aspects of Involving Construction Professionals in International Service-Learning Projects</b> .....	8625
<i>J. Greenleaf, E. Schnore, P. Strenk</i>	
<b>9630 - Get Your Feet Wet! - Experiential Learning Activities along Lost Creek</b> .....	8639
<i>J. Price, S. Niezgodá</i>	

## **T214 – COLLEGE INDUSTRY PARTNERSHIPS DIVISION TECHNICAL SESSION 2**

<b>8648 - The Effect of Cooperative Education, Contextual Support, and Self-Efficacy on Male and Female Student Retention</b> .....	8650
<i>J. Raelin, M. Bailey, J. Hamann, R. Reisberg, D. Whitman, L. Pendleton</i>	
<b>9228 - How to Structure an Internship That is Great for the Intern and the Manager?</b> .....	8684
<i>S. Rangan, M. Natarajathinam</i>	
<b>9327 - The Seamless Pathway: A Partnership Between Community, Industry, and Academia</b> .....	8691
<i>M. Creasy, J. Fuehne</i>	
<b>9151 - CLEAR Scholars in Engineering: Promoting Student Success through Cohort-Building and Industrial Engagement</b> .....	8699
<i>K. Alfrey, S. Hundley, T. Talbert-Hatch, D. Russomanno</i>	
<b>9959 - College and Nonprofit Industry Partnership: Coupling Undergraduate Projects with K-12 Outreach Program to Enhance Engineering Education</b> .....	8707
<i>D. Seth, J. Carr Jr., A. Wenger, L. McNair, J. Tangorra</i>	

## **T216 – BEST OF COMPUTERS IN EDUCATION DIVISION**

<b>9875 - RT-DSP Using “See Through”</b> .....	8724
<i>C. Wright, T. Welch, M. Morrow</i>	
<b>9856 - Expanding a National Network for Automated Analysis of Constructed Response Assessments to Reveal Student Thinking in STEM</b> .....	8736
<i>M. Urban-Lurain, M. Cooper, K. Haudek, J. Kaplan, J. Knight, P. Lemons, C. Lira, J. Merrill, R. Nehm, L. Prevost, M. Smith, M. Sydlík</i>	
<b>9265 - Technology in Classrooms: How Familiar Are New College Students with the Pedagogy?</b> .....	8753
<i>D. Knight, S. Brozina, S. Culver</i>	

<b>10004 - Effectiveness of Online Textbooks vs. Interactive Web-Native Content</b> .....	8764
<i>A. Edgcomb, F. Vahid</i>	

**VOLUME 11**

**T217 – EMERGING COMPUTING AND INFORMATION TECHNOLOGIES**

<b>9482 - Cloud Computing: Is it a Way to Go for Academia?</b> .....	8774
<i>M. Wyne, J. Faraon</i>	
<b>8394 - LabVIEW: A Teaching Tool for the Engineering Courses</b> .....	8809
<i>A. Kavianpour</i>	
<b>8728 - Computing Tools in an Advanced Filter Theory Course</b> .....	8819
<i>S. Mousavinezhad, R. Stuffle, W. Pan, S. Maclure</i>	
<b>9206 - Teaching Modern Object-Oriented Programming to the Blind: An Instructor and Student Experience</b> .....	8829
<i>C. Owen, S. Coburn, J. Castor</i>	
<b>9550 - A Collaborative, Multinational Cyberinfrastructure for Big Data Analytics</b> .....	8843
<i>R. Hansen, T. Włodarczyk, T. Hacker</i>	

**T218 – PEDAGOGICAL APPROACHES IN CONSTRUCTION EDUCATION**

<b>8590 - Implementing PBL in a Concrete Construction Course</b> .....	8856
<i>J. Hu, A. Ortiz, V. Sriraman</i>	
<b>9797 - A Collaborative Learning Method for Construction Project Delivery Methods</b> .....	8870
<i>S. Gunhan</i>	
<b>9970 - Development of Multicourse Undergraduate Learning Communities (MULC) in a Civil Engineering Technology and Construction Management Curriculum</b> .....	8877
<i>T. Nicholas II, D. Chen</i>	
<b>9808 - An Exploratory Study to Identify an Effective Pedagogical Approach to Teaching Math-Related Content Knowledge in Construction Education</b> .....	8888
<i>N. Lee, J. Kovel, L. Lee</i>	
<b>10640 - A Proposed Dynamic Model for Education in Construction Project Planning</b> .....	8898
<i>K. Hurtado, K. Sullivan</i>	

**T219 – CONTINUING PROFESSIONAL DEVELOPMENT DIVISION TECHNICAL SESSION 1**

<b>8443 - Using a Community of Practice to Diffuse Instructional Improvements into the Classroom</b> .....	8906
<i>D. Zemke, S. Zemke</i>	
<b>8611 - Educating Engineering Educators to Nurture 21st Century Indian Engineers</b> .....	8920
<i>F. Mistree, J. Panchal, P. Waychal</i>	
<b>8652 - Work in Progress: Providing Continuing Education for Teachers in the Dominican Republic Using Online Modules Developed through a First Year Capstone Project</b> .....	8937
<i>D. Reeping, K. Reid, J. Estell</i>	
<b>9334 - Training the Trainer: An Integrated University/Industry Program of Improving Russian Industrial Trainers</b> .....	8947
<i>S. Barabanova, J. Ziyatdinova, V. Ivanov, P. Sanger</i>	
<b>10265 - A Faculty Learning Community to Improve Teaching Practices in Large Engineering Courses: Lasting Impacts</b> .....	8954
<i>O. Anderson, C. Finelli</i>	

**T223 – DESIGN ACROSS THE CURRICULUM**

<b>9064 - Creativity in Green Roof Design: Digital Consensual Assessment Outcomes from a High School Engineering Camp</b> .....	8963
<i>J. Buelin-Biesecker, C. Denson</i>	
<b>9749 - Press Play: A Course in Interactive Device Design</b> .....	8979
<i>D. Sirkin, W. Ju</i>	
<b>10403 - A Study on Teaching Functional Modeling in a Sophomore Engineering Design Course</b> .....	8990
<i>R. Nagel, M. Bohm, J. Linsey</i>	
<b>10783 - Building A Healthy Online Student Community Through Education Environment Design</b> .....	9020
<i>K. Bollenbach, E. Powell, S. Moore, J. Groves</i>	
<b>10806 - Project based Learning in Engineering Design Education: Sharing Best Practices</b> .....	9035
<i>A. Shekar</i>	

**T224 – LABORATORY EXPERIENCES WITH MECHANICAL, MATERIALS AND FLUID SYSTEMS**

<b>8403 - A Practical Educational Fatigue Testing Machine</b> .....	9053
<i>B. Sepahpour</i>	



9838 - A Swirling Pipe Flow Course Project .....	9082
<i>J. Matsson</i>	
10642 - New Inexpensive 3D Printers Open Doors to Novel Experiential Learning Practices in Engineering Education.....	9100
<i>N. Jaksic</i>	
9389 - Sensor-based Experimental Evaluation of Mixing Characteristics in Laboratory-scale Reactor Systems .....	9123
<i>S. Chiesa</i>	

### **T225 – STUDENT BELIEFS, MOTIVATION, AND SELF EFFICACY**

8649 - Exploring Engineering Students' Beliefs on Effort and Intelligence .....	9135
<i>N. Honken, P. Ralston, K. Snyder</i>	
9513 - Engineering Student Motivation and Perceived Metacognition in Learning Communities.....	9148
<i>C. Faber, S. Grigg, A. Kirn, J. Chasmar, L. Benson</i>	
10492 - The Effect of the Inverted Classroom Teaching Approach on Student/Faculty Interaction and Students' Self-Efficacy .....	9169
<i>M. Stickel, S. Hari, Q. Liu</i>	
9044 - Engineering Students' Perceptions of the Future: Implications for Student Performance .....	9190
<i>A. Kirn, C. Faber, L. Benson</i>	
9190 - Developing the Academic Performance-Commitment Matrix: How Measures of Objective Academic Performance Can Do More Than Predict College Success.....	9208
<i>A. Bourne, N. Klingbeil, F. Ciarello</i>	

### **T225B – STUDENT LEARNING, PROBLEM SOLVING, & CRITICAL THINKING 1**

9650 - Towards Improving Computational Competencies for Undergraduate Engineering Students .....	9224
<i>C. Vergara, M. Urban-Lurain, J. Sticklen, A.-H. Esfahanian, H. McQuade, A. League, C. Bush, M. Cavanaugh</i>	
9618 - A Cognitive Model for Automatic Student Assessment: Classification of Errors in Engineering Dynamics.....	9238
<i>J. Davis, S. Lorimer</i>	
10520 - Visual Models for Abstract Concepts towards Better Learning Outcomes and Self-Efficacy .....	9248
<i>K. Min, J. Jackman, J. Chan</i>	
10443 - Model Eliciting Activities Motivated Problem Solving Process: Solution Path Analysis .....	9261
<i>N. Vidic, N. Ozaltin, M. Besterfield-Sacre, L. Shuman</i>	
10674 - Accuracy in Student Placement Data .....	9280
<i>C. Paschal</i>	

### **T226 – FLIPPING ECE COURSES**

8725 - A Flipped Classroom Experience: Approach and Lessons Learned .....	9293
<i>R. Bachnak, S. Maldonado</i>	
9083 - Introducing an Instructional Model for “Flipped Engineering Classrooms” -Part (II): How Do Group Discussions Foster Meaningful Learning?.....	9303
<i>J.-L. Lin, P. Imbertson, T. Moore</i>	
10572 - Teaching Electromagnetism with the Inverted Classroom Approach: Student Perceptions and Lessons Learned.....	9323
<i>M. Stickel</i>	
10713 - Flipping a Classroom: A Continual Process of Refinement .....	9338
<i>K. Connor, D. Newman, M. Deyoe</i>	

### **T230 – ADVANCES IN CAD WITH EMPHASIS ON DIMENSIONING**

10807 - Milestones as a Guide to Drafting Project to Improve the Application of Dimensioning Specifications .....	9353
<i>L. Bueno</i>	
9242 - Solid Modeling Strategies - Analyzing Student Choices .....	9363
<i>H. Ault, L. Bu, K. Liu</i>	
9556 - A Review of the Design Intent Concept in the Context of CAD Model Quality Metrics .....	9378
<i>J. Otey, P. Company, M. Contero, J. Camba</i>	
8775 - Modifying an Assembly Project to Improve Student Dimensioning Skills.....	9388
<i>N. Veurink, G. Hein</i>	

### **T236 – ENGINEERING MANAGEMENT DIVISION TECHNICAL SESSION 1**

8484 - History of the Online Master of Engineering Management Program at Rowan University .....	9400
<i>R. Dusseau</i>	
8979 - Why Did the EM Study Abroad Program Become one of the Most Popular on Campus? .....	9409
<i>K. Abel, E. Specking</i>	

<b>10460 - Computer Aided Design and Project Management</b> .....	9418
<i>M. Weiser, H. Saad, K. Larsen</i>	
<b>10635 - Teaching Engineering Project Management via Capstone Designs that Develop a Viable Product</b> .....	9427
<i>D. Bowle, X. Xu, A. Donaldson</i>	

### **T239 – SIMULATIONS AND PROJECT BASED LEARNING II**

<b>9709 - Common Pitfalls in Communications Systems Simulation</b> .....	9436
<i>M. Bazdresch</i>	
<b>10159 - Design and Development of Interactive Simulations to Support an Engineering Technology Course</b> .....	9447
<i>G. Altuger-Genc, Y. Han, Y. Genc</i>	
<b>10208 - A Portable and Low-cost RF Measurement System for Instructional Use</b> .....	9457
<i>Y. Lin, E. Moran, J. Ruhland</i>	
<b>10708 - Geometric Programming - A Tool for Design and Cost Optimization</b> .....	9469
<i>R. Creese</i>	

### **T239B – TOPICS ENHANCING ET EDUCATION**

<b>8659 - Processing of Large Amount of Experimental Data Collected During Laboratory Procedures</b> .....	9482
<i>V. Genis, S. Vyas</i>	
<b>10285 - Creating a Seamless Pipeline Into Undergraduate Programs in Stem Fields Through Region-wide Articulation Agreements</b> .....	9493
<i>I. Edinbarough, M. Bouniaev, B. Elliott</i>	
<b>8997 - The Use of an Iterative Industry Project in a One Semester Capstone Course</b> .....	9507
<i>M. Johnson, J. Alvarado</i>	
<b>9640 - Computer Simulation Tools to Enhance Undergraduate Power Systems Education</b> .....	9518
<i>M. Turner, C. Foreman, R. Sundararajan</i>	

### **T240 – ENTREPRENEURSHIP & ENGINEERING INNOVATION RESEARCH TECHNICAL SESSION 4**

<b>8741 - The Framework on Innovative Engineering</b> .....	9534
<i>D. Ferguson, W. Newstetter, E. Fisher, P. Gangopadhyay, J. Cawthorne Jr., S. Condoor, E. Coyle, D. Wroblewski, C. Huelstrunk</i>	
<b>9031 - A Critical Review of Measures of Innovativeness</b> .....	9556
<i>J. Menold, K. Jablokow, S. Purzer, D. Ferguson, M. Ohland</i>	
<b>9494 - Assessment of a New University-Wide Entrepreneurship and Innovation Minor</b> .....	9575
<i>P. Reeves, S. Zappe, E. Kisenwether, J. Follmer, J. Menold</i>	
<b>9496 - Comparisons of Faculty and Student Definitions of Entrepreneurship</b> .....	9586
<i>P. Reeves, S. Zappe, E. Kisenwether, J. Follmer, J. Menold</i>	
<b>9605 - Deconstructing the Innovator's DNA</b> .....	9604
<i>P. Mathis, N. Fila, S. Purzer</i>	

### **T241 – PROBLEM PROJECT AND CASE BASED LEARNING IN ENVIRONMENTAL ENGINEERING**

<b>8578 - Ms. Hines and the Sick 5th Graders - Making Hands-on Outreach and Learning About the Environment Engaging Through the Use of Case Stories!</b> .....	9616
<i>J. Locklear</i>	
<b>9323 - Competitive Problem Based Learning in an Environmental Engineering Laboratory Course</b> .....	9629
<i>A. Hill, Z. Mitchell Jr.</i>	
<b>8951 - PBL Field Deployment: Lessons Learned Adding a Problem-Based Learning Unit to a Traditional Engineering Lecture and Lab Course</b> .....	9643
<i>M. Williams, S. Ringbauer</i>	

## VOLUME 12

### **T242 – FPD 4: PEERS AND PERCEPTIONS**

<b>9195 - Management and Assessment of a Successful Peer Mentor Program for Increasing Freshmen Retention</b> .....	9658
<i>J. Johnson, A. Niemi, M. Green, L. Gentry</i>	
<b>9492 - The Use Of Peer Evaluations In A Non-Traditional First Year System Design Class</b> .....	9700
<i>J. Pow, M. Helguera, E. Pieri, S. Wolters, M. Augspurger, B. Neuberger, V. Scholl, E. Bondi</i>	
<b>9537 - Peer Assessment of Design Reports in a First-Year Introduction to Engineering Course</b> .....	9715
<i>A. Thompson</i>	
<b>8877 - Learning Outcomes of Introductory Engineering Courses: Student Perceptions</b> .....	9724
<i>S. Kaul, R. Adams</i>	

## **T243 – FUTURE CAREER AND PROFESSIONAL SUCCESS FOR GRADUATE STUDENTS**

<b>10232 - Survey Analysis of Engineering Graduate Students' Perceptions of the Skills Necessary for Career Success in Industry and Academia</b> .....	9739
<i>C. Berdanier, S. Branch, J. London, B. Ahn, M. Cox</i>	
<b>10544 - Development of Industry Modules for Engineers Pursuing Advanced Degrees</b> .....	9753
<i>J. McClurkin, V. Fitzpatrick, C. Berdanier, M. Cox, C. Lynch</i>	
<b>8549 - Graduate Student Identity: A Balancing Act between Roles</b> .....	9764
<i>R. Kajfez, L. McNair</i>	
<b>10524 - Building a Community of Practice Among STEM Graduate Students to Foster Academic and Professional Success</b> .....	9780
<i>R. Tull, M. Nino, K. Holmes</i>	
<b>9129 - Applying Self-authorship Theory among Chinese Engineering Doctoral Students in U.S. Institutions</b> .....	9792
<i>J. Zhu, Q. Liu, M. Cox</i>	

## **T246 – INTERNATIONAL DIVISION TECHNICAL SESSION 3**

<b>10741 - Integrating Study, Research and Internships in a Year-long International Engineering Program Abroad</b> .....	9803
<i>S. Berka, W. Reinhart</i>	
<b>9241 - Use of Data to Enhance Global Engineering Education</b> .....	9826
<i>K. Baran, J. Pytel</i>	

## **T247 – ADDRESSING THE NGSS, PART 2 OF 3: SUPPORTING K 12 SCIENCE TEACHERS IN ENGINEERING PEDAGOGY AND ENGINEERING SCIENCE CONNECTIONS, PART 2 OF 3**

<b>8747 - Place Based STEM: Leveraging Local Resources to Engage K-12 Teachers in Teaching Integrated STEM and for Addressing the Local STEM Pipeline</b> .....	9841
<i>L. Nadelson, A. Seifert, M. McKinney</i>	
<b>8919 - Technology, Engineering, and Design Educator Professional Development System Implementation: Initial Pilot Results</b> .....	9862
<i>J. Ernst, L. Segedin, A. Clark, V. Deluca</i>	
<b>9133 - LiftOff to Best Practices in K-12 Engineering Curriculum Design</b> .....	9875
<i>M. Bagulo, W. Fowler, S. Ramirez</i>	
<b>9317 - Developing Engineering Content for K-12 STEM Classrooms by Providing a Hands-On Engineering Design Experience for Teachers: A Case Study</b> .....	9889
<i>M. Ghalia, H. Huq</i>	
<b>10209 - A State Wide Professional Development Program in Engineering with Science and Math Teachers in Alabama: Fostering Conceptual Understandings of STEM</b> .....	9897
<i>C. Schnittka, G. Turner Jr., R. Colvin, M. Ewald</i>	

## **T247B – BEST PRACTICES IN K 12 AND UNIVERSITY PARTNERSHIPS**

<b>8949 - Best Practices in K-12 and University Partnerships Panel Winners</b> .....	9921
<i>M. Hart, L. Bottomley, J. Roger, M. Portsmouth, J. Goldberg</i>	

## **T249 – MANUFACTURING MATERIALS AND PROCESSES**

<b>8580 - Utilizing Rep-Rap Machines in Engineering Curriculum</b> .....	9968
<i>A. Sirinterlikci, S. Sirinterlikci</i>	
<b>9091 - Integration of Materials Instruction in the Field of Manufacturing</b> .....	9979
<i>R. Mott, R. Bennett, M. Stratton, M. Cossette, T. Stoeb, F. Cox</i>	
<b>8742 - Teaching Manufacturing with Group Cell Practices</b> .....	9994
<i>W. Hung, A. Farmer</i>	
<b>10124 - A 6S Experience in a Manufacturing Facility</b> .....	10006
<i>E. Osakue, D. Smith</i>	

## **T252 – LEARNING AND ASSESSMENT IN ME**

<b>10404 - The Inverted Classroom in Introductory Calculus: Best Practices and Potential Benefits for the Preparation of Engineers</b> .....	10021
<i>R. Talbert</i>	
<b>10475 - Flipping the Classroom to Address Cognitive Obstacles</b> .....	10036
<i>J. Tague, G. Baker</i>	

<b>8703 - Creating Environments for Fostering Effective Critical Thinking in Mathematics Education (Math-EFFECTS)</b> .....	10044
<i>R. Bourn, S. Baxter</i>	
<b>8417 - Standards-Based Grading in a Fluid Mechanics Course</b> .....	10052
<i>S. Post</i>	
<b>8682 - Learning Strategy and Verbal-Visual Preferences for Mechanical Engineering Students</b> .....	10062
<i>C. Baukal Jr., L. Ausburn</i>	
<b>9049 - Predicting Entrepreneurial Intent among Entry-Level Engineering Students</b> .....	10077
<i>M. Schar, S. Billington, S. Sheppard</i>	
<b>9251 - A Strategy for Sustainable Student Outcomes Assessment for a Mechanical Engineering Program That Maximizes Faculty Engagement</b> .....	10114
<i>S. Sundararajan</i>	

### **T253 – TEACHING MECHANICS OF MATERIALS**

<b>9719 - Machine Design Experiments Using Mechanical Springs to Foster Discover Learning</b> .....	10126
<i>P. Malak, M. Nagurka</i>	
<b>9907 - What's Next After Mechanics of Materials?</b> .....	10137
<i>W. Howard, O. Griffin Jr., I. Ragai</i>	
<b>10446 - On Calculating the Slope and Deflection of a Stepped and Tapered Shaft</b> .....	10153
<i>C. Egelhoff, E. Odom</i>	
<b>10636 - Initial Results of Introducing Design and Simulation Based Instruction in Mechanics of Materials</b> .....	10166
<i>C. Papadopoulos, A. Santiago-Roman, G. Portela-Gauthier</i>	

### **T254 – FOCUS ON AFRICAN AMERICAN AND HISPANIC ENGINEERING STUDENTS' PROFESSIONAL AND ACADEMIC DEVELOPMENT**

<b>9294 - Toward a Conceptual Model: African-American Male Students' Motivation, Persistence and Success in Community Colleges</b> .....	10184
<i>O. Davis</i>	
<b>10767 - African American Undergraduate Success in Engineering</b> .....	10198
<i>K. Smith, L. Fleming, I. Moore, S. Burris, F. Bornmann</i>	
<b>8879 - Non-Curricular Activities Help African American Students and Alumni Develop Engineer of 2020 Traits: A Quantitative Look</b> .....	10211
<i>D. Simmons, G. Young, S. Adams, J. Martin</i>	
<b>8442 - African American and Hispanic STEM Students' Engagement at Predominantly White Institutions</b> .....	10227
<i>T. Strayhorn, F. Bie, L. Long III, B. Barrett</i>	
<b>10613 - Hispanics in Engineering</b> .....	10244
<i>N. Diaz</i>	

### **T255 – MULTIDISCIPLINARY COURSES AND PROJECTS**

<b>9723 - A Third-year Review of Design and Packaging for Sensor Systems</b> .....	10255
<i>M. Thomas, A. Mitofsky, V. Jovanovic, J. Eiler</i>	
<b>10156 - Design of a Power Substation: Technical Learning in the Context of an Industry-Sponsored Project</b> .....	10272
<i>M. Habibi, M. Alaei, M. Lynch</i>	
<b>10350 - Case Study of a Multidisciplinary Engineering Capstone Design Project: Electric Drive Control System</b> .....	10281
<i>A. Jariwala, F. Zhou, W. Zeng, S. Li, C. Drexler, C. Wang, H. Zhang, R. Jiao</i>	
<b>9266 - Sustainability in Undergraduate Civil and Mechanical Engineering Instruction</b> .....	10296
<i>K. Leitch, R. Issa</i>	

### **T261 – ENGINEERING PHYSICS & PHYSICS DIVISION TECHNICAL SESSION 3**

<b>9687 - Optical Filter Design, Fabrication and Characterization; A Multifaceted Approach to Project Based Curriculum</b> .....	10308
<i>S. Kirkpatrick, M. Syed, R. Liptak</i>	
<b>10218 - Evaluation of Publisher Provided Online Learning Systems as Pedagogical and Curriculum Assessment Resources</b> .....	10314
<i>K. Purcell</i>	
<b>8450 - Facilitation of Student-centered Formative Assessment using Reflective Quiz Self-corrections in a Calculus Physics Course</b> .....	10322
<i>W. Guo, V. Shekoyan</i>	
<b>8865 - Examining the Diffusion of Research-based Instructional Strategies Using Social Network Analysis: a Case Study of SCALE-UP</b> .....	10337
<i>X. Neumeyer, K. Foote, R. Beichner, M. Dancy, C. Henderson</i>	

<b>9598 - A Phenomenological Study of Factors Influencing the Gender Gap in Physics and other STEM-Related Fields</b> .....	10351
<i>T. Larkin, V. Vogel</i>	

**T266 – SYSTEMS ENGINEERING DIVISION TECHNICAL SESSION 1**

<b>9106 - Introducing Systems Competencies During Undergraduate Design</b> .....	10368
<i>A. Bernal, S. Kirkpatrick, W. Schindel</i>	
<b>9699 - Implementing Problem-Based Learning in a Senior/Graduate Mechatronics Course</b> .....	10383
<i>J. Mynderse, J. Shelton</i>	
<b>9927 - Developing and Teaching a Multidisciplinary Course in Systems Thinking for Sustainability: Lessons Learned through Two Iterations</b> .....	10396
<i>F. Badurdeen, D. Sekulic, B. Gregory, A. Brown, H. Fu</i>	

**T304 – ASEE MAIN PLENARY II**

<b>PIC I Best Paper - The Four Pillars of Manufacturing as a Tool for Evaluating Course Content in the Mechanical Concentration of a General Engineering Curriculum</b> .....	10418
<i>G. Ermer</i>	
<b>PIC II Best Paper - Using Video to Tie Engineering Themes to Foundational Concepts</b> .....	10435
<i>D. Shah, J. French, J. Rankin, L. Breslow</i>	
<b>PIC III Best Paper - How Land Use Change, Changed Culture</b> .....	10448
<i>A. Navickis-Brasch, A. Kern, J. Cadwell, L. Laumatia, F. Fiedler</i>	
<b>PIC IV Best Paper - The Influence of Gender Stereotypes on Role Adoption in Student Teams</b> .....	10461
<i>L. Meadows, D. Sekaquaptewa</i>	
<b>PIC V Best Paper - The Effect of Cooperative Education and Contextual Support on the Retention of Undergraduate Engineering Students</b> .....	10477
<i>J. Raelin, M. Bailey, J. Hamann, D. Whitman, R. Reisberg, L. Pendleton</i>	

**T410 – BIOMEDICAL DIVISION POSTER SESSION**

<b>9730 - Work in Progress: International BME Capstone and Summer Design Experience</b> .....	10503
<i>M. Ruegsegger</i>	
<b>10294 - NSF-REU Site on Neural Engineering: Aiming at High Research Standards (work in progress)</b> .....	10508
<i>R. Castillejos</i>	
<b>8963 - Flipping the Biomedical Engineering Classroom: Implementation and Assessment in Medical Electronics Course</b> .....	10516
<i>J.-M. Maarek</i>	
<b>9184 - Works in Progress: Development of a Need-based BME Design Course Focused on Current NICU Challenges</b> .....	10522
<i>K. Martin, P. Norris, S. Peirce</i>	
<b>10573 - Interactive Web-based Virtual Environment for Learning Single-Use Biomanufacturing Technologies</b> .....	10526
<i>Y. Cherner, B. Dyke</i>	
<b>9867 - Designing Biomedical Engineering Summer Programs for Undergraduates and High School Students: A Case Study of a Work-in-Progress</b> .....	10533
<i>C. Langman, E. Brey, J. Zawojewski</i>	

**VOLUME 13**

<b>10049 - Works in Progress: Generating Interest in Biomedical Engineering through Exploration of the Design Process</b> .....	10537
<i>M. Pool, J. Groh, A. Sieving</i>	
<b>9100 - Works in Progress: Impact of First-Year Micro-/Nano-Technology Research Project Course on Future Research and Graduate/Professional School Involvement</b> .....	10541
<i>M. Spang, A. Strickland, D. Grzybowski</i>	

**T412 – CHEMICAL ENGINEERING DIVISION POSTER SESSION**

<b>8970 - Work in Progress: A Vision for the First “Product Innovation Sequence” for Chemical Engineers</b> .....	10551
<i>C. Bodnar, E. Beckman, J. McCarthy, S. Little</i>	
<b>8456 - Using a Journal Article with Sophomores to Increase Lifelong Learning Confidence</b> .....	10560
<i>L. Ford</i>	

#### **T413 – CIVIL ENGINEERING DIVISION POSTER SESSION**

<b>9997 - MS Projects from Partnership with City Government</b> .....	10573
<i>A. Carlson, T. Jensen, A. Lund, E. Dave, D. Sajtner</i>	
<b>10880 - Use of Peer Review of Projects to Enhance Upper Level Geotechnical Engineering Courses</b> .....	10586
<i>J. Hanson</i>	
<b>9792 - The Effect of Student Placement on the Assessment of Learning and Teaching Styles</b> .....	10596
<i>M. Tefe, E. Schmeckpeper</i>	
<b>9656 - Prevalence of Inscriptions in Transportation Engineering Text: Clues to Context</b> .....	10604
<i>F. Bornasal, S. Brown</i>	
<b>10885 - Geology for Civil and Environmental Engineers - Setting Priorities, Developing Desk Study Skills, and Case Study-Based Learning</b> .....	10622
<i>K. Sutterer</i>	

#### **T414 – COLLEGE INDUSTRY PARTNERSHIPS DIVISION POSTER SESSION**

<b>9670 - Big Picture Thinkers in Industry-Who Are They?</b> .....	10633
<i>H. Ali, R. Adams</i>	
<b>9924 - Outreach Activities as an Integral Part of Promotion and Tenure</b> .....	10651
<i>A. Jackson, S. Jackson</i>	
<b>10071 - SMART® Boards: Implementing Technology for Innovation</b> .....	10660
<i>M. Wilson, M. Summers, T. Goris, J. Gordon</i>	

#### **T416 – COMPUTERS IN EDUCATION DIVISION POSTER SESSION**

<b>9608 - Work in Progress: Development of an Android-based Student Mobile Application for the AIChE Concept Warehouse</b> .....	10678
<i>R. White, B. Brooks, D. Gilbuena, M. Koretsky</i>	
<b>9993 - Work-in-Progress: Developing Online Graduate Courses in Electrical Engineering</b> .....	10688
<i>P. Johanes, L. Lagerstrom</i>	
<b>10347 - Work-in-Progress: Learning Embedded Smartphone Sensing Technology on a Novel Strategy (LESSONS): A Novel Learning Labware Design, Development and Implementation</b> .....	10701
<i>K. Ma, L. Hong, K. Qian, D. Lo</i>	
<b>9633 - Work-in-Progress: A Novel Approach to Collaborative Learning in the Flipped Classroom</b> .....	10707
<i>N. Soundarajan, S. Joshi, R. Ramnath</i>	
<b>10088 - Work-in-Progress: The Platform-Independent Remote Monitoring System (PIRMS) for Situating Users in the Field Virtually</b> .....	10719
<i>D. Brogan, V. Lohani, R. Dymond</i>	
<b>10137 - Work in Progress: Developing Senior Experimental Design Course Projects Involving the Use of a Smartphone</b> .....	10735
<i>D. Bauer, E. Odom</i>	
<b>8546 - Work in Progress: Using Videotelephony to Provide Independent Technical Critique of Student Capstone Projects</b> .....	10742
<i>W. Schilling Jr., J. Estell, K. Al-Olimat</i>	
<b>10516 - Work in Progress: A First Year Common Course on Computational Problem Solving and Programming</b> .....	10754
<i>B. Char, T. Hewett</i>	

#### **T418 – CONSTRUCTION DIVISION POSTER SESSION**

<b>9799 - Covering Advanced Construction Management Topics with Diverse Student Body</b> .....	10771
<i>S. Gunhan, J. Du</i>	
<b>8615 - BIPV Roof Tiles: Effect of Locations on Energy Cost Savings</b> .....	10783
<i>I. Choudhury</i>	
<b>8665 - Kenaf Building Blocks</b> .....	10792
<i>J. Arumala</i>	

#### **T423 – DESIGN IN ENGINEERING EDUCATION DIVISION POSTER SESSION**

<b>10273 - Investigating Team Structure of Interdisciplinary Undergraduate Engineering Student Teams during Design Performance</b> .....	10801
<i>M. McFarland, R. Bailey</i>	
<b>8395 - Engineering Students' Perception of Project Based Learning Activities at the School of Engineering, UBC Okanagan Campus</b> .....	10818
<i>C. Yan, V. Prodanovic, R. Taheri</i>	
<b>9992 - An Experimental Study of Team Effectiveness and Satisfaction in an Engineering Design Course</b> .....	10837
<i>N. Pashazaidi, J. Mohammed</i>	

10127 - Industry-sponsored Vs. Internal design projects at the Iron Range Engineering Program .....	10847
<i>M. Habibi, J. Lange</i>	
9639 - Rethinking Automotive Engineering Education - Deep Orange as a Collaborative Innovation Framework for Project-Based Learning Incorporating Real-World Case Studies .....	10858
<i>A. Qattawi, P. Venhovens, J. Brooks</i>	
10146 - A Real World Design Project in a One Semester Civil Engineering Capstone Design Course.....	10887
<i>J. Huffman</i>	
9697 - Reinforcing a “Design Thinking” Course by Restructuring Student-Instructor Interactions.....	10897
<i>A. Liu, S. Lu</i>	
10229 - A Design Approach in an Introduction to Engineering Course.....	10913
<i>J. Tian</i>	
8494 - Teaching Applied Engineering Through Practicum Courses .....	10925
<i>P. Hylton, W. Otoupal-Hylton</i>	
8843 - K-WIDE: Synthesizing the Entrepreneurial Mindset and Engineering Design .....	10934
<i>C. Kim, J. Tranquillo</i>	
9046 - The Development of Competencies in a Design Course from a Student Perspective .....	10958
<i>W. Smith, Z. Siddique, F. Mistree</i>	
9979 - Elements of Teaching Design under Uncertainty .....	10980
<i>S. Ekwaro-Osire, F. Alemayehu, H. Endeshaw, R. Lozano</i>	
9073 - Student Experiences In An Interdisciplinary Studio-Based Design Course: The Role Of Peer Scaffolding.....	11010
<i>B. Chowdhury, S. Kusano, A. Johri, A. Sharma</i>	
9665 - A Study on the Factors Influencing the Usage of Environmentally Friendly Products .....	11024
<i>N. Esposito, V. Viswanathan, J. Linsey</i>	
10751 - Team-Based Learning Theory Applied to Engineering Education: A Systematic Review of Literature .....	11038
<i>H. Murzi</i>	
10180 - A Framework for Fostering Compassionate Design Thinking During the Design Process.....	11050
<i>P. Seshadri, T. Reid, J. Booth</i>	
8600 - On Engineering Design Education: Exposing Students to Design Knowledge .....	11070
<i>W. Akili</i>	
10702 - Using Behavioral Driven Development (BDD) in Capstone Design Projects .....	11082
<i>A. Goulart</i>	
8941 - Optimizing Linguistic Diversity in Highly Multicultural Engineering Design Teams.....	11096
<i>S. Scharf, J. Foster, K. Behdinan</i>	
10465 - Expansion of the ME/MET Capstone Course from One to Two Quarters .....	11107
<i>M. Weiser, H. Saad, R. Gerlick</i>	
9293 - From Idea to Prototyping a Hands-on Engaging Undergraduate Design Experience.....	11120
<i>D. Raviv, A. Radzins</i>	

**T434 – ENGINEERING LEADERSHIP DEVELOPMENT CONSTITUENT, COMMITTEE, DIVISION POSTER SESSION**

9890 - Pathways to Technology Leadership .....	11137
<i>A. Hurt, R. Deadman, J. Daugherty, D. Lybrook</i>	
10897 - Hoshin Kanri X-Matrix Drives Engineering Leadership Program Success .....	11147
<i>B. Deruntz, R. Kowalchuk, J. Nicklow</i>	
9063 - Developing Engineers Who Lead: Are Student, Faculty and Administrator Perspectives Aligned?.....	11159
<i>B. Novoselich, D. Knight</i>	
9740 - Evaluating the Effects of Non-Anonymity on Student Team-Member Evaluations .....	11176
<i>T. Smith, R. Hotchkiss</i>	

**T435 – ENGINEERING LIBRARIES DIVISION POSTER SESSION**

9565 - Text Books: eBooks or Print.....	11191
<i>A. Khalid, M. Atiqullah, R. Singh, B. Stutzmann</i>	
10798 - Speed Training: Library Instruction in 30 Minutes or Less .....	11208
<i>K. Kozak, D. Kaskie</i>	
9354 - Embedding Video-based Learning Modules for Library Research Methods in an Online Graduate Engineering Degree Program.....	11223
<i>J. Loo, L. Ngo, C. Hennesy, B. Quigley, J. McKenzie</i>	

**T441 – ENVIRONMENTAL ENGINEERING DIVISION POSTER SESSION**

10401 - Investigating Assessment Methods for Informal Environmental Engineering Education Modules for K-12 Students, Specifically Focusing on Sustainability (Extended Abstract: Hands-on Environmental Engineering Panel) .....	11243
<i>R. Citrin, A. Kney</i>	

<b>10533 - Use of In-class Demonstrations and Activities to Convey Fundamentals of Environmental Engineering to Undergraduate Students</b> .....	11249
<i>N. Mladenov, T. Kulkarni, M. London</i>	
<b>8582 - Lesson in Implementing Sustainability Courses Into the Engineering Curriculum</b> .....	11259
<i>B. Striebig, M. Papadakis, A. Ogundipe, S. Morton III</i>	

**T442 – FIRST YEAR PROGRAMS DIVISION POSTER SESSION**

<b>9711 - A Longitudinal Study of the Impact of a First-Year Honors Engineering Program</b> .....	11271
<i>K. Harper, L. Abrams, J. Ruffley</i>	
<b>10340 - Influence of Integrated Academic and Co-Curricular Activities On First-Year Student Success</b> .....	11279
<i>T. Hinds, S. Walton, M. Urban-Lurain, D. Briedis</i>	
<b>9845 - Using Enrollment Management to Influence Student Quality and Retention</b> .....	11299
<i>A. Morse, R. Watson</i>	
<b>10890 - An Analysis of First Year Students' Changing Perceptions of Engineering Design and Practice</b> .....	11309
<i>R. Fries, R. Krauss</i>	
<b>8906 - Enhancing the Educational Experience in Introductory Engineering Courses</b> .....	11318
<i>R. Sundaram</i>	
<b>10119 - Integration of a First-Year Learning Community with a Vertically-Integrated Design Program</b> .....	11332
<i>W. Oakes, C. Zoltowski, M. Cardella, W. Horton</i>	
<b>9156 - Impact of Hands-on First Year Course on Student Knowledge of and Interest in Engineering Disciplines</b> .....	11345
<i>L. Byers, J. Kile, C. Kiassat</i>	
<b>10775 - Competing with “Real Classes”: The Value of Performing Ensemble Experiences for Non-Music Majors</b> .....	11359
<i>I. Cox, M. Cox</i>	
<b>8397 - Implementation of a Low-Budget, First-Year Engineering Project Based Experience: The Design of a Mini-Golf Hole</b> .....	11369
<i>K. Meyers</i>	

**T447 – K 12 AND PRE COLLEGE ENGINEERING DIVISION POSTER SESSION**

<b>8493 - STEM Summer Institute Increases Student and Parent Understanding of Engineering</b> .....	11381
<i>S. Klein-Gardner</i>	
<b>9420 - Summer Engineering Outreach Program for High School Students: Survey and Analysis</b> .....	11390
<i>C. Lam, M. Danforth, H. Mehrpouyan, R. Hughes</i>	
<b>9421 - Shifts in the Cultural Production of "Smartness" Through Engineering in Elementary Classrooms</b> .....	11396
<i>T. Hegedus, H. Carlone, A. Carter</i>	
<b>9446 - Supporting Children's Engineering Discourse and Decision-Making with Multimedia Engineering Notebook Tools (work in progress)</b> .....	11403
<i>K. Wendell, C. Wright, P. Paugh</i>	

**VOLUME 14**

<b>9477 - Integrating Assembly Language Programming into High School STEM Education (Works in Progress)</b> .....	11409
<i>J. Foy, C.-F. Chen, E. Wills</i>	
<b>9571 - Investigating Secondary Students' Engagement with Web-based Engineering Design Processes</b> .....	11421
<i>C. Dejaegher, J. Chiu</i>	
<b>9613 - Design it! Build it! A Summer Engineering Workshop for High School Students to Foster Creativity and Change Perceptions of Engineering (Work in Progress)</b> .....	11432
<i>V. May</i>	
<b>9690 - The Video Case Diagnosis Task: Assessing Pre-Service Teachers' Knowledge of Engineering Design Practices (work in progress)</b> .....	11440
<i>K. Wendell</i>	
<b>10188 - Investigation of High School Pathways into Engineering (work in progress)</b> .....	11448
<i>C. Zoltowski, M. Exter, M. Cardella, T. Shuba, J. Yu, M. Hart, W. Oakes</i>	
<b>9290 - Assessing the First-Year Pilot of STEM: Explore, Discover, Apply - STEM Curricula for Middle Schools (Work in Progress)</b> .....	11458
<i>K. Corbett, J. Coriell, S. Hahler</i>	
<b>10514 - Workforce of the Future: Ideas for Improving K-12 Outreach by Transportation Engineering Educators through Near-Peer Involvement and Leveraging Contextual Exposure</b> .....	11468
<i>N. Nezamuddin, A. Pande</i>	
<b>10527 - A Collaborative K-12 STEM Education Framework Using Traffic Flow as a Real-world Challenge Problem</b> .....	11480
<i>S. Shekar, F. Caglar, A. Dukeman, L. Hou, A. Gokhale, J. Kinnebrew, G. Biswas</i>	
<b>10570 - Four-Way Collaboration Between a Non-Profit, University, Honor Society, and Charter School to Engineer Tropism Machines for Sustainable Space Nutrition Classroom Instruction (Work In Progress)</b> .....	11489
<i>T. Swanson, J. Collins, J. Frey, J. Zocher, M. Traum</i>	



<b>10585 - Leading by Example for Engineering Design (LEED) to Meet Next Generation Science Standards in Middle and High School Science and Math Classes</b> .....	11499
<i>E. Lemley, E. Allan, G. Armstrong, J. Stewart, M. Khandaker</i>	
<b>10738 - Using an Engineering Design Process Portfolio Scoring Rubric to Structure Online High School Engineering Education</b> .....	11512
<i>J. Groves, L. Abts, G. Goldberg</i>	
<b>8783 - K-12 Teacher Internships: Professional Development in the Engineering Design Process and STEM Learning</b> .....	11519
<i>B. Bowen</i>	
<b>8889 - Haptic Abilities and Their Impact on Teaching and Learning in the STEM Fields</b> .....	11527
<i>N. Study, R. Edwards</i>	
<b>8916 - Engineering in the K-12 Classroom</b> .....	11532
<i>D. Besser, D. Monson</i>	
<b>10910 - Capturing Evidence of Metacognitive Awareness of Pre-service STEM Educators' Using 'codifying' of Thinking Through Eportfolios (Research-to-Practice) - Strand: Other</b> .....	11540
<i>P. Rowsome, D. Lane, S. Gordon</i>	
<b>10557 - Capturing the Design Thinking of Young Children Interacting with a Parent</b> .....	11551
<i>B. Dorie, M. Cardella, G. Svarovsky</i>	
<b>10384 - Analyzing Students' Computational Models as they Learn in STEM Disciplines</b> .....	11558
<i>A. Dukeman, S. Shekhar, F. Caglar, A. Gokhale, G. Biswas, J. Kinnebrew</i>	
<b>10190 - Engaging Students in the Complex Issues Surrounding Data Center Thermal Management</b> .....	11566
<i>E. Daney, A. Wemboff, G. Jones</i>	
<b>9003 - A Conceptual Framework for Engineering Design Experiences in High School</b> .....	11573
<i>C. Denson, M. Lammi</i>	
<b>10169 - Identifying and Cultivating Diverse STEM Talent through Creative Robotics</b> .....	11581
<i>J. Cross, E. Hamner</i>	

#### **T448 – LIBERAL EDUCATION/ENGINEERING & SOCIETY DIVISION POSTER SESSION**

<b>8602 - Engineering Education Outside the Classroom: Informal Learning Environments as Settings for Engineering Education for both the Public and Engineers</b> .....	11587
<i>C. Phillips</i>	
<b>9471 - Organizing a Student Poster Session in an ASEE Section Conference</b> .....	11604
<i>S. Watkins, L. Kinsler, J. Morse, D. Carroll</i>	
<b>9942 - Scenario and Scoring Sheet Development for Engineering Professional Skill Assessment</b> .....	11621
<i>J. McCormack, S. Beyerlein, A. Kranov, P. Pedrow, E. Schmeckpeper</i>	
<b>10832 - Communication Skills Course: Enhancing Presentation and Proposal Writing Skills of Chemical Engineering Students</b> .....	11639
<i>K. Mulia, E. Krisanti</i>	

#### **T450 – MATERIALS DIVISION POSTER SESSION**

<b>8873 - Fast Formative Feedback using Muddiest Points and Just In Time tools in Engineering Materials courses</b> .....	11650
<i>W. Stuart</i>	
<b>10433 - Enhancing and Supporting Integrated Computational Material Science Engineering Education</b> .....	11660
<i>N. Sukhija, T. Haupt, M. Horstemeyer</i>	

#### **T452 – MECHANICAL DIVISION POSTER SESSION**

<b>10089 - Thermodynamics in the Arts</b> .....	11675
<i>H. Dillon</i>	
<b>10506 - An Attempt to Gamify a First Course in Thermodynamics</b> .....	11688
<i>A. Trivett</i>	
<b>8392 - Particle Transport, Deposition and Removal- A Research Based Curriculum Development</b> .....	11708
<i>G. Ahmadi</i>	
<b>8496 - Student Perceptions of Connections between Statics Class and Co-op Work Experience</b> .....	11719
<i>D. Peters, J. Arbor</i>	
<b>8776 - Development of a Low Cost Impedance Tube to Measure Acoustic Absorption and Transmission Loss of Materials</b> .....	11735
<i>S. Deshpande, M. Rao</i>	
<b>9008 - Adding Flexibility and Hands-On Experiences while Minimizing Sequential Gaps in the ME Curriculum</b> .....	11750
<i>M. Gordon, B. Davidson, C. Lengsfeld</i>	
<b>9520 - I Should Not be Expected to Teach English!...But</b> .....	11756
<i>C. Gunn, P. Polunin</i>	
<b>9865 - Demonstration of an Automated Assembly Process for Proton Exchange Membrane Fuel Cells Using Robotic Technology</b> .....	11773
<i>V. Gurau</i>	

#### **T455 – MULTIDISCIPLINARY ENGINEERING DIVISION POSTER SESSION**

<b>8525 - Arab Idols: Multidisciplinary Mentoring Panel Critiques Design Team Performance</b> .....	11780
<i>S. Scott, J. Sheikh-Ahmad, J. Mohammed, S. Cubero Jr., K. Abdalla</i>	
<b>10170 - A Hybrid Interdisciplinary Mechatronics Engineering Course Using Content Based Learning and Project Based Learning</b> .....	11797
<i>G. Coutinho, A. Ferraz, C. Coutinho</i>	
<b>10530 - An Update to a Multidisciplinary Hydroelectric Generation Design Project</b> .....	11807
<i>D. Feinauer, M. Prairie</i>	

#### **T465 – STUDENT DIVISION POSTER SESSION**

<b>10365 - Affordable Lab Kit for Controls Education</b> .....	11820
<i>R. Reck</i>	
<b>10619 - Exploring the Development of Undergraduate Research Experience</b> .....	11823
<i>K. Patsavas, B. Caldwell</i>	

#### **T471 – WOMEN IN ENGINEERING DIVISION POSTER SESSION**

<b>9143 - Predicting Time to Graduation in Engineering by Student Behavior and Gender</b> .....	11830
<i>C. Valle, J. Leonard II</i>	
<b>9573 - Does Engineering Attract or Repel Female Students Who Passionately Want to Help People?</b> .....	11846
<i>A. Bielefeldt</i>	
<b>10661 - Mary Poppins Was a Very Wise Woman: Insights for Effective Leadership in Academia</b> .....	11860
<i>J. Terpenny</i>	

#### **T512 – IMPROVING LABORATORY EDUCATION IN CHEMICAL ENGINEERING**

<b>8910 - Comparing Misconceptions in Fluid Mechanics Using Interview Analysis Pre and Post Hands-on Learning Module Treatment</b> .....	11871
<i>J. Burgher, D. Finkel, B. Wie, O. Adesope</i>	
<b>8619 - The Paperless Lab - Streamlining a Modern Unit Operations Laboratory Course to Reduce Faculty Time Commitment</b> .....	11882
<i>M. Cooper</i>	
<b>8705 - Automated Process Control Laboratory Experience: Simultaneous Temperature and Level Control in a Continuously Stirred Tank Reactor System</b> .....	11895
<i>J. Levinson, E. Maase, G. Tennyson</i>	
<b>9339 - A Course in Problem Solving with Experimental Design</b> .....	11916
<i>J. Enszer</i>	
<b>9534 - Artificial Organs Leading to Real Engineering Learning [Work-in-Progress]</b> .....	11932
<i>M. Staehle, T. Merrill, S. Farrell</i>	

#### **T515 – IMPACT OF COMMUNITY ENGAGEMENT ON STUDENTS**

<b>8657 - Student Perceptions of Design Projects That Involve Developing Assistive Devices for Elementary School Children with Disabilities</b> .....	11941
<i>M. Siniawski, V. Graf, S. Draxton</i>	
<b>10138 - Engineering Pathways Study: Lessons Learned in Its Development and Implementation</b> .....	11952
<i>C. Swan, K. Paterson, T. Hellickson</i>	
<b>9203 - Volunteering in Earthquake Disaster Programs: Engineering Students' Perceptions and Motivations</b> .....	11966
<i>H. Baytiyeh, M. Naja</i>	
<b>9216 - The Assessment of Earthquake Preparatory Knowledge and Activities of Lebanese Engineering Students</b> .....	11978
<i>H. Baytiyeh</i>	
<b>9741 - Community Engagement in a First-Year Engineering Communication Course: Increasing Student Numbers from Handfuls to Hundreds.</b> .....	11988
<i>L. Patterson</i>	

#### **T519 – CONTINUING PROFESSIONAL DEVELOPMENT DIVISION TECHNICAL SESSION 2**

<b>9052 - Using Faculty Communities to Drive Sustainable Reform: Learning from the Strategic Instructional Initiatives Program</b> .....	11998
<i>G. Herman, L. Crowley</i>	
<b>9780 - Analysis of Students' Feedback in a Faculty Award System</b> .....	12007
<i>P. Waychal</i>	
<b>9819 - A Comparison of Adult Learning Characteristics between First-year and Senior Capstone Students</b> .....	12016
<i>J. Pembroke</i>	

<b>10314 - Using Recorded Lectures and Low Stakes Online Quizzes to Improve Learning Efficiency in Undergraduate Engineering Courses</b> .....	12034
<i>D. Dimas, F. Jabbari, J. Billimek</i>	
<b>8439 - Good to Great - Enhancing Services to Professional Working Adult Learners through a Campus-Wide Benchmarking Study</b> .....	12049
<i>M. Springer, M. Schuver</i>	

**T523 – CAPSTONE DESIGN**

<b>8526 - Student-Generated Metrics as a Predictor of Success in Capstone Design</b> .....	12058
<i>B. Smyser, B. Jaeger</i>	
<b>9172 - Examining the Structure of a Multidisciplinary Engineering Capstone Design Program</b> .....	12071
<i>B. Rhoads, C. Whitfield, J. Allenstein, P. Rogers</i>	
<b>9629 - The Innovation Canvas as a Teaching Tool in Capstone Design: A Reverse-Engineering Case Study</b> .....	12088
<i>R. Rogge, G. Livesay, J. Ahmed, W. Kline, R. Bunch, M. Wollowski</i>	
<b>10304 - Reframing Engineering Capstone Design Pedagogy for Design with Communities</b> .....	12102
<i>B. Lucero, C. Turner</i>	
<b>8477 - Technical Design Reviews in Capstone</b> .....	12122
<i>G. Dixon</i>	

**T525 – METHODOLOGICAL & THEORETICAL CONTRIBUTIONS TO ENGINEERING EDUCATION 3**

<b>9662 - Recollecting Experience in Interviews: the Structure and Organization of Engineering 'Interview Talk'</b> .....	12135
<i>F. Bornasal, J. Lester, S. Brown</i>	
<b>9343 - from the Mouths of Students: Two Illustrations of Narrative Analysis to Understand Engineering Education's Ruling Relations As Gendered and Raced</b> .....	12148
<i>A. Pawley, C. Phillips</i>	
<b>9962 - Methods for Examining the Educational Pathways of Adult Makers</b> .....	12171
<i>M. Lande, S. Jordan</i>	
<b>8550 - A Mixed Methods Analysis and Evaluation of the Mixed Methods Research Literature in Engineering Education</b> .....	12184
<i>R. Kajfez, E. Creamer</i>	
<b>9416 - Identification of Students' Epistemological Frames in Engineering</b> .....	12200
<i>C. Smith, A. Bowen, D. Montfort, M. Koretsky</i>	

**T525B – ENGINEERING FACULTY: INTERACTIONS, INFLUENCES AND ISSUES**

<b>8669 - Engineering Practice in the Academic Plan: External Influences, Faculty, and their Teaching Roles</b> .....	12218
<i>M. Brown, D. Knight</i>	
<b>8899 - The Influence of Student-Faculty Interactions on Post-Graduation Intentions in a Research Experience for Undergraduates (REU) Program: A Case Study</b> .....	12242
<i>L. Massi, C. McKinzie, A. Gesquiere, S. Seal</i>	
<b>9139 - Faculty Approaches to Working Life Issues in Engineering Curricula</b> .....	12258
<i>M. Magnell, L. Geschwind, L. Gumaelius, A. Kolmos</i>	
<b>9695 - Faculty Perceptions of Student Engagement: A Qualitative Inquiry</b> .....	12271
<i>M. Panizo, J. Hollander, J. Pappas, O. Pierrakos, R. Anderson</i>	

**VOLUME 15**

**T530 – INNOVATIVE GRAPHICS INSTRUCTION**

<b>9677 - Assessing the Technology Management Preparation of Design Technologists</b> .....	12292
<i>R. Chin</i>	
<b>10152 - Graphics within Initial Technology Teacher Education: A Snapshot of Ireland and USA</b> .....	12300
<i>D. Lane, T. Branoff, R. Lynch</i>	
<b>10764 - Considering Cognitive Load As a Key Element in Instructional Design for Developing Graphical Capability</b> .....	12312
<i>T. Delahunty, N. Seery, R. Lynch, D. Lane</i>	
<b>9366 - Incorporating Active Learning into the Graphical Communications Course</b> .....	12319
<i>L. Sun</i>	

**T539 – NEW COURSE DEVELOPMENT CONCEPTS IN ET I**

<b>8592 - Evaluation of an Interactive Classroom Tool Applied in an Introductory Electric Circuits Course</b> .....	12327
<i>S. Dunning</i>	
<b>8662 - Quality Control Education - A University Course in Acoustic Emission</b> .....	12332
<i>V. Genis, M. Carr, S. Vyas, A. Pollock</i>	

<b>9196 - Using Excel to Implement the Finite Difference Method for 2-D Heat Transfer in a Mechanical Engineering Technology Course</b> .....	12347
<i>R. Edwards, M. Lobaugh</i>	
<b>9417 - A Learning-by-Doing Technology Program Based on Traditional Engineering Foundations and Hands-on Implementation-Driven</b> .....	12365
<i>J. Crichigno, I. Hurtado, A. Perez, R. Peralta</i>	

### **T539B – ISSUES IN ET EDUCATION I**

<b>9093 - Faculty Technical Currency and Professional Development: 2013 Status Report on a National Survey of Engineering Technology Faculty</b> .....	12388
<i>A. Khan, A. Karim</i>	
<b>8656 - Failure Analysis for Engineering Technology Students</b> .....	12409
<i>R. Michael, F. Nitterright, R. Edwards</i>	
<b>8721 - Answering a Renewed Call for Action in Engineering Technology</b> .....	12423
<i>E. Barbieri</i>	

### **T542 – FDP 5: COURSE DELIVERY METHODS AND ISSUES**

<b>9087 - You May be Able to Teach Early Classes, but Students May Not be Awake Yet!</b> .....	12437
<i>F. Marbouti, H. Diefes-Dux, J. Strobel</i>	
<b>8701 - A Hybrid Flipped First Year Engineering Course</b> .....	12448
<i>J. Everett, J. Morgan, J. Stanzione III, K. Mallouk</i>	
<b>8754 - Effect of Flipping the Classroom on Student Performance in First Year Engineering Courses</b> .....	12466
<i>K. Ossman, G. Bucks</i>	
<b>9381 - Student Perceptions of Inverted Classroom Benefits in a First-Year Engineering Course</b> .....	12479
<i>K. Kecskemety, B. Morin</i>	

### **T543 – PROFESSIONAL DEVELOPMENT AND ADVISING FOR GRADUATE STUDENTS**

<b>9067 - Finish my Research! Find a Job! Feel Better! Seminars to Support Engineering Graduate Students' Professional and Personal Goals</b> .....	12492
<i>K. Luchini-Colbry, T. Gonzalez</i>	
<b>8969 - The PhD Advising Relationship: Needs of Returning and Direct-Pathway Students</b> .....	12500
<i>E. Mosyjowski, S. Daly, D. Peters, S. Skerlos, A. Baker</i>	
<b>10980 - A Community of Practice Approach to Becoming an Engineering Education Research Professional</b> .....	12513
<i>R. Adams, C. Berdanier, A. Branham, N. Choudhary, T. Fletcher, M. Goldstein, C. Joslyn, C. Mathis, E. Sverling, N. Trellinger, M. Wilson</i>	
<b>9727 - Assessing Doctoral Students' Employability Skills</b> .....	12540
<i>F. Marbouti, C. Lynch</i>	

### **T546 – INTERNATIONAL DIVISION TECHNICAL SESSION 4**

<b>9516 - International Students and Engineering Departments Facing the Speak Test</b> .....	12548
<i>C. Gunn, P. Polunin</i>	
<b>9553 - Paths to Accreditation</b> .....	12554
<i>J. Fraser, A. Teran, H. Pham</i>	

### **T547 – PRINCIPLES OF K 12 ENGINEERING EDUCATION AND PRACTICE**

<b>9180 - Physical Testing in an Elementary Engineering Camp</b> .....	12574
<i>C. Andrews</i>	
<b>9197 - Undergraduate Training to Teach a Hands-on, Problem-based, Novel Application of Embedded Technology in K-12 Classrooms</b> .....	12588
<i>Y. Allam, A. Manasseh, A. Smith, W. Bowen, S. Panjwani, C. Sparks, J. Alequin, J. Dankson, C. Clarke, N. Maskiell, N. Vazquez, M. Schoener</i>	
<b>9624 - Perspectives on Failure in the Classroom by Elementary Teachers New to Teaching Engineering</b> .....	12606
<i>P. Lottero-Perdue, E. Parry</i>	
<b>10494 - Analysis of Design Process Knowledge Task Responses: Statistical Approaches to Uncover Patterns (Research)</b> .....	12642
<i>M. Cardella, M.-C. Hsu, G. Ricco</i>	
<b>10605 - Exploring How Design Critique Processes Shape Fifth Graders' Peer Interaction in Collaborative Engineering Projects</b> .....	12660
<i>M. Jordan</i>	

## **T547B – K 12 ENGINEERING RESOURCES: BEST PRACTICES IN CURRICULUM DESIGN, PART 2 OF 2**

<b>9563 - K-12 Pedagogical Tunable Modules</b> .....	12673
<i>A. Chavez, S. Jaco, A. Roldan, M. Ferrer, J. Sim, G. Youssef</i>	
<b>9986 - Examination of Integrated STEM Curricula as a Means Toward Quality K-12 Engineering Education (Research to Practice)</b> .....	12685
<i>A. Glancy, T. Moore, S. Guzey, C. Mathis, K. Tank, E. Siverling</i>	
<b>9885 - You're Hired! Changing Students' Attitudes Towards Engineering</b> .....	12699
<i>K. Brevik, B. Bowen, F. Bowman, K. Jean</i>	

## **T548A – TEACHING COMMUNICATION I**

<b>8570 - An Integrated Approach to Developing Technical Communication Skills in Engineering Students</b> .....	12720
<i>R. Harichandran, D. Adams, M. Collura, N. Erdil, W. Harding, J. Nocito-Gobel, A. Thompson</i>	
<b>10109 - Adventures in Paragraph Writing: the Development and Refinement of Scalable and Effective Writing Exercises for Large Enrollment Engineering Courses</b> .....	12740
<i>R. Essig, C. Troy, B. Jesiek, J. Boyd, N. Trellinger</i>	
<b>10394 - A Math-Based System to Improve Engineering Writing Outcomes</b> .....	12764
<i>B. Henderson</i>	
<b>10703 - Match or Mismatch: Engineering Faculty Beliefs about Communication and Teamwork versus Published Criteria</b> .....	12799
<i>M. Paretti, K. Cross, H. Matusovich</i>	

## **T549 – USE OF TECHNOLOGY FOR EDUCATION**

<b>8607 - Design of Laboratory Apparatus for Temperature Prediction in Turning Process</b> .....	12810
<i>Z. Wu, N. Ghariban</i>	
<b>8672 - Analyzing Porosity in Thermal Barrier Coatings: Edge Detection of Images using MATLAB</b> .....	12820
<i>D. Robinson, P. Ramsundar, C. Samantaray</i>	
<b>8914 - Enhancing Manufacturing Process Education via Computer Simulation and Visualization</b> .....	12832
<i>P. Manohar, S. Acharya, P. Wu</i>	
<b>10420 - Developing Infrared Thermography as an Instructional Tool for Monitoring Energy Efficiency Issues in Micro-Manufacturing</b> .....	12842
<i>R. Chiou, M. Mauk, T.-L. Tseng, M. Carr, A. Mathews</i>	
<b>8514 - An Investigation of Engineers' Use of a Virtual Collaborative Environment for Automated Assembly System Design</b> .....	12858
<i>S.-J. Hsieh</i>	

## **T550 – MATERIALS DIVISION TECHNICAL SESSION 2**

<b>8568 - Use of Process Oriented Guided Inquiry Learning for Introduction to Materials</b> .....	12871
<i>E. Douglas, T. Raymond, C. Waters, W. Hughes, M. Koro-Ljungberg, M. Miller</i>	
<b>10299 - Integrating Eco-Design in Manufacturing Materials and Processes Related Courses - Material Selection for Sustainable Design using CES Package</b> .....	12879
<i>Y. Ertekin, I. Husanu, R. Chiou</i>	
<b>10870 - Eliminating Lectures (and video lectures) in Large Introductory Materials Science and Engineering Courses: Large Gains in Student Learning</b> .....	12891
<i>S. Yalisove, S. Daly</i>	
<b>10586 - The Effect of Incorporating YouTube Videos into an Intervention Addressing Students' Misconceptions Related to Solutions, Solubility, and Saturation</b> .....	12904
<i>S. Maass, S. Krause</i>	
<b>10105 - An Undergraduate Research Project to Test a Composite Wetting Resin Material for Dental Applications</b> .....	12921
<i>R. Abdelsalam, W. Rijk</i>	

## **T551 – APPROACHES TO MATHEMATICS CURRICULUM TO INCLUDE PROJECTS AND TECHNOLOGIES**

<b>8559 - Microdynamics versus Macrodynamics - An Interdisciplinary Student Project</b> .....	12931
<i>G. Bischof, A. Casey, E. Andreeva-Moschen</i>	
<b>9418 - A Comprehensive Approach on Delivering Calculus to Engineering Students</b> .....	12946
<i>C. Lam, M. Danforth, R. Hughes</i>	
<b>9124 - A Departmental Initiative to Effectively Incorporate Technology Use in Engineering Mathematics Education: A Case Study</b> .....	12954
<i>J. Hieb, P. Ralston</i>	

## **T552 – ME LABORATORIES AND UNDERGRADUATE RESEARCH**

<b>8574 - Enhancement of the Engineering Measurements Laboratory for Semester Conversion</b> .....	12966
<i>M. Schertzer, P. Victoria, K. Leopold, J. Wellin</i>	
<b>9027 - Development and Evolution of a New Mechanical Design Laboratory Course</b> .....	12980
<i>S. Marra</i>	
<b>9253 - Development, Assessment and Evaluation of Remote Thermo-fluids Laboratory Experiments: Results from a Pilot Study</b> .....	12995
<i>S. Sundararajan, J. Dautremont</i>	
<b>10623 - Design and Implementation of a Low Cost Particle Image Velocimetry System for Undergraduate Research and Education</b> .....	13007
<i>B. Ring, E. Lemley</i>	

## **T553 – NEW TEACHING METHODS IN MECHANICS**

<b>8402 - Video-based Online Learning: The Other Side of the Looking Glass</b> .....	13019
<i>D. Kawano, B. Tongue</i>	
<b>9239 - Engagement in Interactive Web-based Courseware as part of a Lecture based Course and the Relation to Student Performance</b> .....	13037
<i>P. Steif, A. Dollar</i>	
<b>9892 - Promoting Research-Based Instruction in Statics and Dynamics: A Virtual Community of Practice</b> .....	13051
<i>B. Self, E. Berger</i>	
<b>10682 - Utilizing Concept Maps to Improve Engineering Course Curriculum in Teaching Mechanics</b> .....	13066
<i>R. Pierre-Antoine, S. Sheppard, M. Schar</i>	
<b>10411 - Evaluation of Impact of Web-based Activities on Mechanics Achievement and Self-Efficacy</b> .....	13076
<i>S. Billington, S. Sheppard, R. Calfee, P. Boylan-Ashraf</i>	

## **T554 – MENTORING MINORITIES: EFFECTIVE PROGRAMS, PRACTICES, AND PERSPECTIVES**

<b>10370 - A Case Study of Success: Mentoring and Supporting Underrepresented Transfer Students in a Mechanical Engineering Program</b> .....	13095
<i>R. Ryan, N. Durdella, T. Navarro</i>	
<b>10851 - Mentoring Minorities: Examining Mentoring from a Race and Gender Lens</b> .....	13111
<i>J.-L. Mondisa</i>	
<b>10508 - Mentoring Practices Proven to Broaden Participation in STEM Disciplines</b> .....	13124
<i>L. Crumpton-Young, A. Elde, K. Ambrose</i>	
<b>9234 - ENGAGE 2Be Engineers Mentoring Program for Minority Students</b> .....	13131
<i>M. McCullough, S. Luster-Teasley, C. Gloster Jr., L. Parrish, M. Williams, R. Bailey</i>	
<b>9383 - Relational Development as a Cornerstone of Success in Latino STEM Retention</b> .....	13146
<i>D. Hoyt, C. Pezeshki, J. Acevedo, J. Acevedo, C. Cisneros</i>	

## **VOLUME 16**

## **T555 – INTEGRATION OF ENGINEERING AND OTHER DISCIPLINES (INCLUDING LIBERAL ARTS)**

<b>8981 - What's in the Soup? Auto-ethnographies from an Engineer, a Physicist, and an English Professor Regarding a Successful Multidisciplinary Grand Challenge Program</b> .....	13170
<i>A. Watt, S. Kirkpatrick, A. Bernal</i>	
<b>9075 - Integration of Art and Engineering: Creating Connections between Engineering Curricula and an Art Museum's Collection</b> .....	13181
<i>K. Wikoff, C. Narnicki, J. Kieselburg II</i>	
<b>8653 - Integrated 2D Design in the Curriculum: Effectiveness of Early Cross-Subject Engineering Challenges</b> .....	13205
<i>K. Otto, B. Camburn, K. Wood, G. Nannicini, R. Bouffanais, E. Kyoseva, J. Yong, D. Poletti, R. Simpson, A. Mathur</i>	
<b>10168 - A Sequence of Technology Commercialization Courses for Science and Engineering</b> .....	13223
<i>A. Felse, I. Kourkine</i>	

## **T556 - POTPORRUI**

<b>8785 - Taking the Leap: Moving from Industry to the Academy</b> .....	13239
<i>W. Schell Iv, P. Kauffmann</i>	
<b>10286 - Initiation of Summer Camp Program as Outreach and Recruiting Tool</b> .....	13249
<i>A. Genau</i>	
<b>10117 - Engineers Assemble: The Use of Popular Culture in Engineering Education</b> .....	13261
<i>M. Selby</i>	
<b>8922 - Mentoring Engineering Students: Challenges and Potential Rewards</b> .....	13267
<i>W. Akili</i>	

<b>8774 - What Can Reflections From an "Innovation in Engineering Education" Workshop Teach New Faculty?</b> .....	13280
<i>E. Dringenberg, M. Chua</i>	
<b>10302 - Students' Perspectives on Homework and Problem Sets in STEM Courses</b> .....	13294
<i>L. Eaton, S. Sheppard, H. Chen</i>	

**T559 – OCEAN AND MARINE DIVISION TECHNICAL SESSION 1**

<b>9148 - Challenge-based Engineering through the Design, Assembly and Testing of Underwater Vehicle</b> .....	13312
<i>S. Aravamudhan, D. Schmidt, H. Nakhla</i>	
<b>10010 - SAMPLE: Small Autonomous Monitoring Platform for Lakes and Estuaries, a Student Engineering Project</b> .....	13320
<i>M. Diab, U. Ezechi, M. Dyab, A. Nagchaudhuri, M. Mitra</i>	
<b>10126 - Simulation and Control of an Unmanned Surface Vehicle</b> .....	13329
<i>L. McLauchlan</i>	
<b>10174 - A Laboratory Exercise - Unmanned Vehicle Control and Wireless Sensor Networks</b> .....	13340
<i>L. McLauchlan, M. Mehrubeoglu</i>	
<b>9497 - Low-cost Wireless Sensor Network for Coastal Monitoring as Undergraduate Research Project</b> .....	13350
<i>R. Belu, I. Husanu</i>	
<b>10561 - Architecture of a Dynamic Position Autonomous Vessel</b> .....	13363
<i>J. Cogley, T. Emami, A. Dahlen, R. Hartnett</i>	
<b>10656 - Real Collaborative Environments Using Technologies Based on Mobile Devices and Internet Tools</b> .....	13374
<i>C. Mora, J. Martin-Gutierrez, B. Anorbe-Diaz, R. Mellado, A. Marrero</i>	
<b>10809 - Lessons in On-Campus and Distance Learning Delivery of an Introductory Naval Architecture Course</b> .....	13387
<i>J. Michaeli</i>	
<b>9032 - A Coastal/Ocean Engineering Graduate Project: Evaluation of Hurricane Protection Concept</b> .....	13393
<i>R. Whalin, T. Richardson, H. Das, D. Hendon</i>	

**T563 – SOFTWARE ENGINEERING CONSTITUENT COMMITTEE DIVISION TECHNICAL SESSION 1**

<b>9340 - Students vs. Professionals in Assisted Requirements Tracing: How Could We Train Our Students?</b> .....	13408
<i>T. Bhowmik, N. Niu, D. Reese</i>	
<b>9465 - Enhancing Computer Science Programming Courses to Prepare Students for Software Engineering</b> .....	13428
<i>J. Li, P. Morreale</i>	
<b>10033 - A Hybrid Design Methodology for an Introductory Software Engineering Course with Integrated Mobile Application Development</b> .....	13439
<i>V. Subbian, C. Purdy</i>	

**T566 – SYSTEMS ENGINEERING DIVISION TECHNICAL SESSION 2**

<b>9235 - Development of a Systems Engineering Course for Multiple Delivery Methods</b> .....	13449
<i>R. Sugarman, K. Schneider, E. Mykytyka</i>	
<b>9429 - A "Software and Systems" Integration Framework for Teaching Requirements Engineering</b> .....	13459
<i>R. Babiceanu</i>	
<b>9715 - Embedding Systems Engineering Practices into Systems Engineering Classes</b> .....	13471
<i>S. Teng</i>	
<b>9832 - Using a Marketplace to Form Multidisciplinary Systems Engineering Capstone Project Teams</b> .....	13478
<i>M. Ardis, C. Carmen, M. Delorme, E. Hole</i>	

**T570 – ENHANCING SUCCESS/PERSISTENCE AT TWO YEAR COLLEGES**

<b>10662 - NSF S-STEM Scholarship Grant for Engineering and Applied Technology Majors to Increase Enrollment and Retention</b> .....	13495
<i>K. Baltaci, M. Thompson, B. Yuksek</i>	
<b>8629 - Mentoring Faculty for Leadership Development: From IBM to Academia: A Model for Knowledge Transfer Through Mentoring</b> .....	13502
<i>E. Craft, M. Wijenaik, D. Faber</i>	
<b>8446 - EDGE 2013 Program - A Redesign Work in Progress</b> .....	13516
<i>D. Dimitru, J. O'Connor</i>	
<b>8824 - Developmental Mathematics and the Community College STEM Pipeline</b> .....	13537
<i>V. Lundy-Wagner</i>	

**T610 – DESIGN IN THE CURRICULUM**

<b>8891 - Biomedical Signal Processing: Designing an Engineering Laboratory Course Using Low-Cost Hardware and Software</b> .....	13550
<i>F. Carvalho, R. Shankar</i>	

<b>8905 - 'Historical' Rapid Design Challenge for Bioengineering Senior Design</b> .....	13561
<i>J. Sweeney, K. Csavina, L. Zidek</i>	
<b>9462 - Using Guided Design Instruction to Motivate BME Sophomore Students to Learn Multidisciplinary Engineering Skills</b> .....	13570
<i>A. Nimunkar, J. Puccinelli, M. Bollom, W. Tompkins</i>	
<b>9589 - An Experience with Electronic Laboratory Notebooks in Real-World, Client-Based BME Design Courses</b> .....	13587
<i>J. Puccinelli, A. Nimunkar</i>	

### **T612 – VIRTUAL AND ONLINE LEARNING TOOLS IN CHEMICAL ENGINEERING EDUCATION**

<b>9158 - Development of Interactive Virtual Laboratories to Help Students Learn Difficult Concepts in Thermodynamics</b> .....	13596
<i>A. Bowen, D. Reid, M. Koretsky</i>	
<b>10245 - Improving Student Interaction with Chemical Engineering Learning Tools: Screencasts and Simulations</b> .....	13622
<i>G. Nicodemus, J. Falconer, W. Medlin, K. McDanel, J. Knutsen</i>	
<b>9546 - Simulation-Based Guided Explorations in Process Dynamics and Control</b> .....	13630
<i>M. Staehle, B. Ogunnaike</i>	
<b>8539 - Educational Modules on Solar Energy</b> .....	13642
<i>J. Keith, L. Rayfield, N. Palsule</i>	
<b>10068 - Incorporating the Online Encyclopedia of Chemical Engineering Equipment Into Your Course Activities</b> .....	13656
<i>S. Montgomery</i>	

### **T613 – INNOVATIVE TECHNIQUES IN STRUCTURAL ENGINEERING COURSES**

<b>9379 - Work in Progress: Using Outcomes-Based Assessment in an Introductory Structural Engineering Course</b> .....	13667
<i>M. Roberts, A. Jones, M. Thompson</i>	
<b>9138 - Structural Engineering Practicum: The First Course in a Master's Program</b> .....	13694
<i>J. Hanson, J. Aidoo, K. Kershaw, M. Lovell, H. Hagen-Atwell, M. Ross</i>	
<b>9519 - Integration of Prerequisite Resource Materials in a Structural Design of Foundations Course Using Pencasts</b> .....	13711
<i>J. Laman, M. Brannon</i>	

### **T614 – COLLEGE INDUSTRY PARTNERSHIPS DIVISION TECHNICAL SESSION 3**

<b>9182 - Counter Current - Perspectives from My Move to the Corporate World from Academia</b> .....	13728
<i>J. Oliva</i>	
<b>9498 - More than Advice: Increasing Industry Advisory Board Member Involvement</b> .....	13738
<i>J. Jones</i>	
<b>9813 - Building Sustainable Industry Partnerships That Engage Faculty and Prepare Job Ready Students</b> .....	13747
<i>M. Angolia, J. Pickard, L. Pagliari, C. Lesko Jr.</i>	
<b>10846 - A Case for Utilizing Outreach Opportunities to Improve Faculty Performance</b> .....	13761
<i>J. Sanders, M. Angolia</i>	

### **T615 – MODELS OF COMMUNITY ENGAGEMENT PRACTICES**

<b>8557 – Relational Versus Transactional Community Engagement: An Experience of the Benefits and Costs</b> .....	13771
<i>L. Vanasupa, L. Schlemmer</i>	
<b>8964 - Restoring Water, Culture, and Relationships: Using a Community Based Participatory Research Methodology for Engineering Education</b> .....	13782
<i>A. Navickis-Brasch, A. Kern, F. Fiedler, J. Cadwell, L. Laumatia, K. Haynie, C. Meyer</i>	
<b>9244 - How to Recruit and Retain Students using an Engineering Ambassador</b> .....	13797
<i>J. Bates, C. Orantes</i>	
<b>9871 - Integrating Community Engagement, Freshman Chemical Engineering, and an AIChE Student Chapter</b> .....	13810
<i>B. Elmore</i>	
<b>10075 - Learning from Failure: Developing a Typology to Enhance Global Service-learning Engineering Projects</b> .....	13822
<i>A. Mazzurco, B. Jesiek</i>	
<b>9369 - A Personal Account on Implementing Reflective Practices</b> .....	13834
<i>T. Forin</i>	

### **T617 – CURRICULAR ISSUES IN COMPUTING AND INFORMATION TECHNOLOGY PROGRAMS II**

<b>10108 - Assessing BS-CS Student Outcomes Using Senior Project</b> .....	13851
<i>N. Pestaina, T. Solis, P. Clarke</i>	
<b>8722 - Using Interdisciplinary Game-based Learning to Develop Problem Solving and Writing Skills</b> .....	13866
<i>R. Lansiquot, A. Satyanarayana, C. Cabo</i>	
<b>10919 - Innovative Uses of Classroom Tools &amp; Technologies to Foster Students' Learning</b> .....	13885
<i>M. Sarder</i>	



<b>9953 - Hybrid MPI-OpenMP versus MPI Implementations: A Case Study</b> .....	13901
<i>O. Mangual, M. Teixeira, R. Lopez-Roig, F. Nevarez-Ayala</i>	
<b>8740 - Transition from Concepts to Practical Skills in Computer Programming Courses: Factor and Cluster Analysis</b> .....	13919
<i>C. Cabo</i>	

**T619 – CPD TECHNICAL SESSION**

<b>9048 - The PEER Collaborative: Supporting Engineering Education Research Faculty with Near-peer Mentoring Unconference Workshops</b> .....	13931
<i>A. Pawley, A. Carberry, M. Cardella, M.-I. Carnasciali, S. Daly, J. Gorlewicz, G. Herman, M. Hynes, S. Jordan, N. Kellam, M. Lande, M. Verleger, D. Yang</i>	
<b>10019 - Building Industry-Academia Partnerships that Foster Organizational Learning Models</b> .....	13950
<i>S. Chakrabarti, K. Curry, Z. Gredlics</i>	
<b>10107 - Personnel Improvement Plan: A Professionalism Assignment for Engineering Students</b> .....	13959
<i>M. Habibi, R. Ulseth, A. Lillesve</i>	
<b>10447 - A MOOC with a Business Plan</b> .....	13968
<i>E. Rutz, J. Tappel, B. Zirger</i>	
<b>8421 - Creating Synergistic Opportunities for Professional Adult Continuing Learners through Engineering and Technology Collaborations</b> .....	13977
<i>M. Springer, M. Schuver</i>	

**T622 – BEST ZONE PAPER COMPETITION**

<b>Best Zone 1 Paper - Investigating and Visualizing Measurement Error for Novice “STEM” Learners</b> .....	13992
<i>N/A</i>	
<b>Best Zone 2 paper - Problem-Based Learning to Promote Student Creativity</b> .....	14006
<i>N/A</i>	
<b>Best Zone 3 paper - The Impact of Peer Interaction Exercises in a Signals and Systems Course</b> .....	14018
<i>N/A</i>	
<b>Best Zone 4 paper - Teaching Bioinformatics in Concert: an Interdisciplinary Collaborative Project-based Experience</b> .....	14027
<i>A. Dekhtyar, A. Goodman, A. Montana</i>	

**VOLUME 17**

**T623 – BEST OF DEED**

<b>10569 - The Professional Guide: A Resource for Preparing Capstone Design Students to Function Effectively on Industry-sponsored Project Teams</b> .....	14049
<i>R. Stanfill, A. Rigby, M. Milch</i>	
<b>9716 - Flipping the Classroom at Scale to Achieve Integration of Theory and Practice in a First Year Engineering Design and Build Course</b> .....	14071
<i>C. Reidsma, L. Kavanagh, L. Jolly</i>	
<b>8781 - The Design Problem Framework: Using Adaption-Innovation Theory to Construct Design Problem Statements</b> .....	14084
<i>E. Silk, S. Daly, K. Jablowkow, S. Yilmaz, M. Rosenberg</i>	
<b>8452 - A Case-Study Analysis of Design Heuristics in an Upper-Level Cross-Disciplinary Design Course</b> .....	14112
<i>J. Kramer, S. Daly, S. Yilmaz, C. Seifert</i>	
<b>8844 - Development and Validation of the Engineering Design Metacognitive Questionnaire</b> .....	14129
<i>O. Lawanto, H. Santos</i>	

**T624 – OUTSTANDING CONTRIBUTIONS TO STUDENT LEARNING THROUGH LABORATORY EXPERIENCES**

<b>9040 - An Implementation of Electronic Laboratory Notebooks (ELN) Using a Learning Management System Platform in an Undergraduate Experimental Engineering Course</b> .....	14140
<i>M. Cardenas</i>	
<b>9047 - MEMS-based Educational Laboratory</b> .....	14156
<i>T. Dallas</i>	
<b>10471 - Embedded Computing Reinforces and Integrates Concepts Across ECE Curriculum</b> .....	14168
<i>H. Powell, J. Dugan</i>	
<b>8859 - Student Peer Teaching in Engineering Laboratory Situations</b> .....	14180
<i>E. Kim, T. Schubert Jr., F. Jacobitz</i>	

## **T625B – ENGINEERING STUDENT EXPERIENCES**

<b>10733 - Creating a STEM Identity: Investment with Return</b> .....	14191
<i>J. Callahan, P. Pyke, S. Shadle, R. Landrum</i>	
<b>9117 - Engagement of Students at the United States Air Force Academy</b> .....	14206
<i>S. Blum</i>	
<b>10030 - “Professional” Acts: Analyzing Sites of Identity and Interactive Response in Chemical Engineering Students</b> .....	14240
<i>D. Tihanyi, P. Kinnear</i>	
<b>10360 - Public vs. Private, Large vs. Small: Significant Differences in Student Affective Experience</b> .....	14257
<i>D. Wilson, J. Pembroke, C. Wasilewski</i>	
<b>9097 - Why I Am an Engineering Major: A Cross-Sectional Study of Undergraduate Students</b> .....	14274
<i>L. Nadelson, D. Mooney, J. Rush-Byers, N. Dean</i>	

## **T626 – ECE PROGRAM DEVELOPMENT**

<b>8591 - Globalization: Comparing Chinese and US Electrical Engineering Undergraduate Program</b> .....	14296
<i>H. Zhong, L. Zhao, Y. Zhang</i>	
<b>9378 - An Innovative Transfer Track from Associate in Applied Science in Electrical Engineering Technology to Bachelor of Science in Electrical Engineering</b> .....	14306
<i>R. Strangeway, S. Williams, E. Chandler, R. Keinhofer, O. Petersen</i>	
<b>10407 - The Small Satellite (CubeSat) Program as a Pedagogical Framework for the Undergraduate EE Curriculum</b> .....	14320
<i>W. Holman, B. Sierawski, R. Reed, R. Weller, A. Sternberg, R. Austin, D. Fleetwood</i>	
<b>10843 - Methods and Approaches for Developing the Future Leaders of the Electric Power and Energy Industries</b> .....	14332
<i>B. Grainger, G. Reed</i>	

## **T627 – ENERGY CONSERVATION AND CONVERSIONS FOR GREEN BUILDINGS**

<b>10801 - Educating Students about Energy: A Practical Approach</b> .....	14353
<i>M. Fathizadeh</i>	
<b>10696 - TRNSYS as an Education Tool to Predict Indoor Environment Temperature for Undergraduate Students</b> .....	14364
<i>A. Megri</i>	
<b>9801 - An Energy Assessment of a Large Grain Storage and Transfer Facility in Michigan: an Industry, University and Public Utility Company Collaborative Effort Resulting in Energy Savings Outcomes</b> .....	14376
<i>R. Fletcher</i>	
<b>9625 - A Multidisciplinary Design and Analysis for a Green Roof Installation</b> .....	14394
<i>B. Field, K. Hall</i>	
<b>9952 - Design and Automation of a Zero Energy Model House (ZEH)</b> .....	14403
<i>J. Chahine, M. Ha, V. Hem, V. Tzouanas</i>	

## **T636 – ENGINEERING MANAGEMENT DIVISION TECHNICAL SESSION 2**

<b>9026 - An Implementation of Continuous Improvement of The Engineering Management Program at California State University, Northridge</b> .....	14416
<i>S. Gandhi, A. Sarfaraz, S. Talebian</i>	
<b>8594 - Applying Six Sigma in Higher Education Quality Improvement</b> .....	14432
<i>Q. Mazumder</i>	
<b>9170 - A Strategic Engineering Management Approach to Innovation and Organizational Sustainability: An Addition to the Engineering Management Curriculum?</b> .....	14446
<i>M. Browder, A. Czuchry, L. Boughers, C. Deutsch, N. Muehl</i>	
<b>9902 - Innovative Teaching of Product Design and Development in an Engineering Management Program</b> .....	14469
<i>S. Sivaloganathan, A. Al-Marzouqi</i>	

## **T639 – ISSUES IN ET EDUCATION II**

<b>9101 - How to Improve a Textbook with Engineering Technology Students</b> .....	14485
<i>B. Dupen</i>	
<b>10503 - "Is it Going to be on the Test?" An Introductory Study of the Factors Influencing Engineering Technology Student Motivation</b> .....	14498
<i>L. Sharma, C. Scherrer</i>	
<b>9337 - How Do You Teach Vibrations to Technology Students?</b> .....	14507
<i>M. Creasy</i>	

## **T639B – NEW COURSE DEVELOPMENT CONCEPTS IN ET II**

<b>9558 - Innovation in Construction: New Course Development Within a Construction Management Curriculum</b> .....	14517
<i>J. White, V. Ray, D. Koo</i>	
<b>10203 - Enhancing Student Learning with Self-directed Tutorials in a Freshman Level Engineering Technology Course</b> .....	14527
<i>G. Altuger-Genc</i>	
<b>9065 - Unique Collaborations between Engineering and Engineering Technology Programs</b> .....	14536
<i>T. Brower</i>	
<b>9316 - Construction of a Vibrating Structure for Demonstration of Vibration Measurement and FFT Analysis</b> .....	14548
<i>A. Alexander, K. Belanus</i>	

## **T642 – FPD 6: COURSE CONTENT AND EDUCATIONAL STRATEGIES**

<b>9314 - Implementation and Assessment of a Failure Case Study in a Multi-Discipline Freshman Introduction to Engineering Course</b> .....	14558
<i>J. Lewis, N. Delatte</i>	
<b>9805 - Collaborative Cloud-based Documents for Real-time Bi-directional Feedback in Large Lecture Activities</b> .....	14569
<i>B. Frank, B. Hamgini</i>	
<b>9712 - Integration of ePortfolios in a First Year Engineering Course for Measuring Student Engagement</b> .....	14581
<i>V. Goodrich, E. Aguiar Jr., G. Ambrose, L. McWilliams, J. Brockman, N. Chawla</i>	
<b>8743 - Review of a First-Year Engineering Design Course</b> .....	14597
<i>L. Predergast, E. Etkina</i>	

## **T643 – TEACHING AND PEDAGOGY ISSUES IN GRADUATE EDUCATION**

<b>8404 - Enticing Undergraduate Students to Pursue Graduate Research at an Undergraduate-Focused Institution</b> .....	14626
<i>A. Wemhoff</i>	
<b>8422 - Overcoming the Writing Challenges of Students in a Distance Delivery Technology Master of Science Program</b> .....	14637
<i>M. Shaurette, R. Rapp</i>	
<b>10334 - Workshops on Fundamental Engineering Skills: A Graduate Student-Led Teaching Initiative</b> .....	14652
<i>J. Foley, A. Verhoff, J. Pitre Jr., K. Ropella</i>	

## **T646 – INTERNATIONAL DIVISION TECHNICAL SESSION 5**

<b>10929 - Building Transatlantic Collaboration for Excellence in Doctoral Education</b> .....	14668
<i>J. Orozco, J. Sun, K. McDonald, C. Jimenez-Rico, J.-M. Martinez-Rubio</i>	
<b>9412 - Collaboration of Afghan and American Universities in a New Architectural Engineering Program at Herat University, Afghanistan</b> .....	14672
<i>H. Fayez, M. Keshawarz</i>	

## **T647 – K 12 AND PRE COLLEGE ENGINEERING DIVISION CURRICULUM EXCHANGE**

<b>8624 - The EPICS Program: Innovative Education for Authentic Learning</b> .....	14680
<i>J. Trusedell, M. Hart</i>	
<b>9276 - STEM Explore, Discover, Apply - A Middle School Elective (Curriculum Exchange)</b> .....	14682
<i>K. Corbett, J. Coriell</i>	
<b>9296 - Advanced Mathematics for Engineering &amp; Science - A Fourth Year High School Mathematics Course (Curriculum Exchange)</b> .....	14684
<i>J. Coriell, K. Corbett</i>	
<b>9355 - LEDs &amp; Lamps - A Friendly Affordable Gateway to Electrical Exploration (Curriculum Exchange)</b> .....	14686
<i>A. Tubesing</i>	
<b>9710 - Nature-Inspired Design: A PictureSTEM Project Curriculum Module (Curriculum Exchange)</b> .....	14689
<i>T. Moore, K. Tank</i>	
<b>9722 - The EngrTEAMS Project: STEM Integration Curricula for Grades 4-8 (Curriculum Exchange)</b> .....	14691
<i>T. Moore, S. Guzey, A. Glancy</i>	
<b>9807 - Curriculum Exchange: Cantilever Bridging</b> .....	14693
<i>S. Ressler, C. Bale</i>	
<b>9842 - Science Learning with Design, Engineering and Robotics (Curriculum Exchange)</b> .....	14696
<i>M. Ryan, S. Gross, J. Gale, B. Kostka, N. Newsome, B. Gane, J. Koval, J. Rosen</i>	
<b>9863 - Innovation Center: Preparing High School Students for the 21st Century Economy by Providing Resources and Opportunities to Create Genuine Projects with Industry Partners (work in progress)</b> .....	14698
<i>J. Steckel, P. Quinones, M. Zarske, D. Knight</i>	
<b>9906 - Robotics and Engineering Course Curriculum(Curriculum Exchange)</b> .....	14704
<i>N. Robinson III, J. Rosen, J. Koval</i>	

<b>10198 - Curriculum Exchange: Studio STEM, Engineering After School</b> .....	14706
<i>C. Schnittka</i>	
<b>10212 - Using Engineering to Address the Common Core Standards: A Four Week Workshop (Curriculum Exchange)</b> .....	14709
<i>P. Carison, R. Smith</i>	
<b>10239 - Graduate Students Help to Create a Discovery-based and Cooperative Learning Experience About Clean Energy for High School Students (Curriculum Exchange)</b> .....	14712
<i>J. Hutchison</i>	
<b>10481 - Designing Engineering Curriculum for Pre-Service Teachers in preparation for NGSS: Medical Mission Drop (Curriculum Exchange)</b> .....	14714
<i>A. Bergen, K. Chen</i>	
<b>10694 - C-STEM Curriculum for Integrated Computing and STEM Education (Curriculum Exchange)</b> .....	14716
<i>H. Cheng</i>	
<b>8399 - Girls CREATE: Teaching K-8 Girls Engineering Principles through Illustrative Story Telling</b> .....	14718
<i>A. Lee</i>	
<b>8931 - Engaging Youth through Engineering Modules (Curriculum Exchange)</b> .....	14720
<i>S. Pruet, M. Dean</i>	
<b>10876 - Dive In! An Integrated Design Thinking/STEM Curriculum</b> .....	14723
<i>S. Goldman, M. Carroll, M. Zielzinski, A. Loh, E. Ng, S. Bachas-Daunert</i>	
<b>10687 - Curriculum Exchange: Teaching Energy Concepts using Chain Reaction Machines</b> .....	14725
<i>S. McCall, O. Dairymple, S. Jordan</i>	

### **T648 – THE INTERDISCIPLINARY NATURE OF ENGINEERING**

<b>9357 - Integrating Philosophy, Cognitive Science, and Computational Methods at a Polytechnic Institution: Experiences of Interdisciplinary Course Designs for Critical Thinking</b> .....	14727
<i>M. Vurkac</i>	
<b>10066 - Introducing Engineering as a Socio-technical Process</b> .....	14762
<i>B. Cohen, J. Rossmann, K. Bernhardt</i>	
<b>10073 - Intersections of Humanities and Engineering: Experiments in Engineering Specific Humanities Electives and Pedagogies</b> .....	14776
<i>A. Chong, L. Wilkinson, D. Tihanyi</i>	
<b>10480 - When Engineering Meets Self and Society: Students Reflect on the Integration of Engineering and Liberal Education</b> .....	14790
<i>X. Tang</i>	

### **T649 – GREEN AND SUSTAINABLE MANUFACTURING EDUCATION**

<b>8731 - Integrating the Energy Efficiency and Assessment Components into Manufacturing</b> .....	14807
<i>I. Fidan</i>	
<b>8757 - Incorporating Sustainability and Green Design Concepts into the Engineering and Engineering Technology Curriculum and Programs</b> .....	14817
<i>R. Belu, R. Chiou, T.-L. Tseng, L. Cioca</i>	
<b>10424 - Prototype Design of a Solar Greenhouse Incorporating Clean Energy Manufacturing Concept</b> .....	14830
<i>R. Chiou, R. Belu, T.-L. Tseng, M. Carr, B. Ramesh</i>	
<b>10683 - Fusing Green Energy into Manufacturing Engineering Education to Cultivate Technical Success</b> .....	14846
<i>T.-L. Tseng, R. Chiou, P. Mandal, E. Smith, R. Belu, O. Selcedo</i>	
<b>10940 - Enabling Multidisciplinary Perspective in Student Design Project: Fast Fashion and Sustainable Manufacturing Systems</b> .....	14867
<i>V. Jovanovic, M. Mann, P. Katsioloudis, D. Dickerson</i>	

### **T652A – ATTRACTING, DEVELOPING AND RETAINING TALENTED ME STUDENTS**

<b>8917 - Student Demographics and Outcomes in Mechanical and Aerospace Engineering Including Migration between the Disciplines</b> .....	14877
<i>M. Orr, S. Lord, M. Ohland, R. Layton</i>	
<b>9226 - Effective Strategies for Generating Awareness and Interest in Science and Engineering among Underrepresented Youth</b> .....	14887
<i>M. Ellingsen, C. Degen, M. Bedillion, K. Muci-Kuchler</i>	
<b>9440 - Active Learning Modules Assessments: An Update of Results by Gender and Ethnic Groups</b> .....	14901
<i>A. Brown, D. Jensen, R. Crawford, J. Rencis, E. Sargent, B. Dunlap, R. Hackett, K. Jackson, K. Watson, I. Orabi, J. Liu, J. Wood, C. Wejmar, P. Schimpf, C.-C. Chen</i>	

## VOLUME 18

### **T654 – PREPARING MINORITY STUDENTS FOR UNDERGRADUATE AND GRADUATE RESEARCH**

<b>10098 - Underrepresented Minority Students and Graduate School</b> .....	14922
<i>M. Anderson-Rowland</i>	
<b>9375 - Beyond Persistence: Graduate School Aspirations of Hispanic Engineering Students at HSIs</b> .....	14933
<i>L. Fleming, S. Burriss, K. Smith, L. Bliss, I. Moore, F. Bornmann</i>	
<b>10244 - Engineering and Science Student Preparedness for Research: Exploring the Connections Between Student Identity and Readiness for Research</b> .....	14943
<i>E. McCave, J. Gilmore, K. Burg</i>	
<b>10971 - Influence of NSF Funded Undergraduate Research Assistantships on Underrepresented Minority Students</b> .....	14958
<i>N. Yilmaz, F. Vigil, M. Trujillo, I. Acevedo-Rodriguez, R. Jacques</i>	
<b>9486 - Promoting STEM Education and Careers among Hispanics and Other Minorities through Programs, Enrichment, and other Activities</b> .....	14970
<i>M. Khasawneh, R. Bachnak, R. Goonatilake, R. Lin, P. Biswas, S. Maldonado</i>	

### **T655 – MULTIDISCIPLINARY EXPERIENTIAL LEARNING**

<b>9669 - A Multidisciplinary MOOC on Creativity, Innovation, and Change: Encouraging Experimentation and Experiential Learning on a Grand Scale</b> .....	14987
<i>K. Jablolkow, J. Matson, D. Velegol</i>	
<b>10934 - Supplemental Multimedia Online Learning Tool (SMOLT) in Engineering Education</b> .....	15011
<i>L. Sun, C. Gribbins, I. Ferguson</i>	
<b>10331 - Understanding How Students' Value the Behaviors of Individuals in Engineering Teams</b> .....	15023
<i>R. Nagel, E. Pappas, G. Hazard, M. Swain</i>	
<b>8608 - Competitive Placement of Engineering Students on Multiyear Project Teams</b> .....	15036
<i>H. Underwood, D. Pratt</i>	

### **T656 – INVITED PANEL: PREPARING YOUR TEACHING PORTFOLIO**

<b>10003 - Preparing Your Teaching Portfolio</b> .....	15051
<i>K. Dee, G. Livesay, J. Williams</i>	

### **T663A – SOFTWARE ENGINEERING CONSTITUENT COMMITTEE DIVISION TECHNICAL SESSION 2**

<b>10040 - UnLecture: Bridging the Gap between Computing Education and Software Engineering Practice</b> .....	15057
<i>V. Subbian, C. Purdy</i>	
<b>10939 - Use of Microsoft Testing Tools to Teach Software Testing: An Experience Report</b> .....	15068
<i>G. Lopez, A. Martinez</i>	
<b>10496 - Creating Research Opportunities with Robotics across the Undergraduate STEM Curricula</b> .....	15088
<i>J. Zalewski, F. Gonzalez</i>	

### **T666 – SYSTEMS ENGINEERING DIVISION TECHNICAL SESSION 3**

<b>8935 - Practicing and Assessing Formal Systems Competencies in ECE Senior Design</b> .....	15104
<i>M. Simoni, W. Schindel, X. Mu, D. Moore, W. Padgett</i>	
<b>9467 - Evaluation of Blended Learning Technologies in a Large Enrollment Case-based Systems Engineering Course</b> .....	15125
<i>Y. Bi, R. Bailey, M. Smith</i>	
<b>10611 - Multidisciplinary Design Optimization of Robotic Football Players by Undergraduate Students from Multiple Science and Engineering Programs</b> .....	15145
<i>A. El-Rahaiby, A. Tovar</i>	
<b>8893 - Inclusion of Renewable Energy Topics in the Design of Experiments Course for Industrial and Systems Engineering Students</b> .....	15154
<i>Y. Wang, L. Li</i>	

### **T671 – WIED: FACULTY AND GENDER ISSUES**

<b>8553 - Creating a Sustainable Model for an NSF ADVANCE Project</b> .....	15164
<i>J. Carpenter</i>	
<b>9913 - Promoting Alternative Teaching-Professor Hires: A New PATH for Engineering State University</b> .....	15188
<i>C. Cass, L. Bullard, A. Vila-Parrish</i>	
<b>9951 - Faculty Awards at a Large Private Institution: An Indicator of Evolving University Values?</b> .....	15197
<i>S. Mason, C. Marchetti, M. Bailey, S. Baum</i>	

9839 - The Use and Misuse of "Gender" and "Sex" Terminologies in Civil Engineering Literature .....	15216
<i>C. Poleacovschi, A. Javernick-Will</i>	
10794 - Research Leadership Development Initiative: An Experiment for a Research Career Choice .....	15233
<i>S. Wadia-Fascetti, J. Rinehart, S. Pitts</i>	

### **T616 – LABORATORY APPLICATIONS OF COMPUTERS**

10607 - Use of FreeRTOS in Teaching Real-time Embedded Systems Design Course .....	15253
<i>N. He, H.-W. Huang</i>	
8837 - DICOM, MRI and Bioinstrumentation using Matlab and Simulink .....	15264
<i>M. Muqri, S. Chng</i>	
8876 - Development of a Suit of Virtual Experiments for Physics and Chemistry Undergraduate Laboratories .....	15289
<i>O. Satope, I. Boboye, O. Akinwale, L. Kehinde, O. Asubiojo</i>	
8992 - Developing Control Experiments as a part of a Remote Laboratory Facility .....	15306
<i>A. Azad, P. Kaushik</i>	

### **T642B – FPD 7: BEYOND COURSE CONTENT**

9599 - Making a First-year Impression: Engineering Projects That Affect and Connect .....	15321
<i>S. Freeman, B. Jaeger, R. Whalen</i>	
9569 - Social Responsibility Attitudes of First Year Engineering Students and the Impact of Courses .....	15338
<i>A. Bielefeldt, N. Canney</i>	
10634 - An Exploratory Study on the Contextual Challenges and Barriers of Introducing Sustainability to First Year Engineering Students .....	15354
<i>L. Bedoya-Valencia, K. Palacio, S. Spencer-Workman, Y. Correa-Martinez</i>	
10112 - What Sticks with First Year Engineering Students and Engineering Faculty in STEM Education Service-Learning Projects? .....	15374
<i>J. Love, S. Freeman, D. Sullivan</i>	

### **T646B – INTERNATIONAL TECHNICAL SESSION 6**

10082 - Creating an International Profile of a Degree Program in Mechanical Engineering .....	15387
<i>M. Grimheden</i>	
9345 - Understanding Change and Development of Engineering Education in China .....	15397
<i>Z. Zhou, C. Pezechki</i>	
8790 - Assessing Metacognition During Problem-Solving in Two Senior Concurrent Courses .....	15410
<i>S. Guerrero, N. Ramirez-Corona, A. Lopez-Malo, E. Palou</i>	

### **T647B – K 12 COMPUTER SCIENCE AND COMPUTATIONAL THINKING INITIATIVES**

9720 - A Google Computer Science for High School Workshop .....	15425
<i>A. Naz, M. Lu</i>	
9844 - Learning Experience Through RoboCupJunior: Promoting Engineering and Computational Thinking Skills through Robotics Competition .....	15438
<i>A. Eguchi</i>	
9407 - Enhancing Computational Thinking Skills for New Mexico Schools .....	15456
<i>A. Perez, I. Hurtado, J. Crichigno, R. Peralto, D. Torres</i>	

### **T652B – THERMODYNAMICS, FLUIDS AND HEAT TRANSFER II**

8881 - The Effect of Peer-Led Review on Exam Performance in Fluid Mechanics .....	15471
<i>T. Shepard</i>	
10253 - An Inventory to Assess Students' Knowledge of Second Law Concepts .....	15484
<i>T. Jacobs, J. Caton</i>	
10626 - Assessment of Fundamental Concept in Thermodynamics .....	15502
<i>A. Karimi, R. Manteufel</i>	
10903 - Investigating Student Conceptual Difficulties in Thermodynamics Across Multiple Disciplines: The First Law and P-V Diagrams .....	15524
<i>J. Clark, J. Thompson, D. Mountcastle</i>	

### **T663B – SOFTWARE ENGINEERING CONSTITUENT COMMITTEE DIVISION TECHNICAL SESSION 3**

10123 - Student Learning and Use of Tools in an Undergraduate Software Testing Class .....	15541
<i>P. Clarke, D. Davis, R. Lau, T. King</i>	

10865 - Teaching Basic Class Diagram Notation with UMLGrader .....	15557
<i>R. Hasker, Y. Shi</i>	

**T670B – AN EXAMINATION OF METHODS TO ENHANCE TRANSFER STUDENT ENROLLMENT, RETENTION, PERSISTENCE, AND OUTCOMES**

9141 - Multiple Starting Lines: Pre-college Characteristics of Community College and Four-year Institution Engineering Students .....	15568
<i>D. Knight, I. Bergom, B. Burt, L. Lattuca</i>	
8882 - Transfer Student Pipeline to Engineering & Engineering Technology Programs .....	15591
<i>S. Gupta, D. Johnson, M. Eastman, V. Amuso Sr., J. Morelli</i>	
10750 - Improving Transfer Student Success .....	15599
<i>J. Laier, S. Steadman</i>	
9331 - Implementing Project-Based Learning in Physics and Statics Courses .....	15605
<i>S. Liu</i>	

**W113 – INNOVATIVE TEACHING TECHNIQUES IN THE CLASSROOM**

8759 - An Innovative Way to Teach Sustainability in Civil Engineering Material Class .....	15614
<i>G. Nossoni</i>	
9297 - Using Student Instruction to Increase Retention in Engineering .....	15622
<i>R. Welch, K. Bower, K. Marley, A. Martin</i>	
9053 - Understanding the Benefits of the Flipped Classroom in the Context of Sustainable Engineering .....	15636
<i>J. Marks, K. Ketchman, D. Riley II, L. Brown, M. Bilec</i>	
10256 - The Effectiveness of “Interactive” Slide Presentations for Promoting Student Engagement in University Engineering Courses .....	15649
<i>S. Wirth, A. Liel, J. McCartney</i>	
10889 - Inspiring Student Engagement through Two-Minute Follies .....	15663
<i>J. Klosky, S. Katalenich, B. Spittka, S. Freyne</i>	

**W116 – GENERAL TECHNICAL SESSION 1**

8473 - Teaching During The Final Exam: How Providing Hints Can Help .....	15692
<i>C. Rogers, J. Schnepf</i>	
10952 - A Pilot Study Exploring Augmented Reality to Increase Motivation of Chinese College Students Learning English .....	15700
<i>S. Li, Y. Chen, D. Whittinghill, M. Vorvoreanu</i>	
10140 - The Impact of Reducing Numerical Methods and Programming Courses on Undergraduate Performance .....	15715
<i>S. Morse, A. Morse, V. Uddameri, E. Hernandez, D. Earnset</i>	
10323 - Testing a Prototype System for Mining of Student Notes and Questions to Create Study Guides .....	15725
<i>P. Samson</i>	

**W125 – STUDENT LEARNING, PROBLEM SOLVING, & CRITICAL THINKING 1**

9667 - Understanding Students' Process for Solving Engineering Problems Using Eye Gaze Data .....	15734
<i>Y. Bi, T. Reid</i>	
9900 - Methods for Assessing Epistemic Identities: Student Representations of Design and Engineering Practice .....	15758
<i>M. Lande</i>	
9468 - Exploring Student Computational Practices in Solving Complex Engineering Design Problems .....	15769
<i>O. Alabi, A. Magana, R. Garcia</i>	
9018 - Student Autonomy: Implications of Design-Based Informal Learning Experiences in Engineering .....	15782
<i>S. Kusano, A. Johri</i>	

**VOLUME 19**

8967 - Honest Expert Solutions Towards Cognitive Apprenticeship .....	15794
<i>S. Moseley, R. McCord</i>	

**W126 – NEW ECE COURSES**

8522 - Development of Lab Activities for an ECE Undergraduate Renewable Energy Course .....	15810
<i>L. Zhao, Y. Zhang, J. Zhang</i>	
9431 - A Breadth First Course in Electrical and Computer Engineering .....	15820
<i>C. Hendrix, D. Neebel, R. Silva</i>	
9501 - Student Projects Course for Computer Engineering Majors .....	15837
<i>D. Blandford, M. Randall</i>	

<b>10406 - Introducing Nanotechnology into an Undergraduate Microelectronics Course</b> .....	15847
<i>C. Lee, S. Schneider, T. Thiess</i>	

**W127 – MISCELLANEOUS TOPICS IN ENERGY EDUCATION**

<b>8771 - The Future of Coal</b> .....	15861
<i>C. Foreman, K. Halim, R. Sundararajan</i>	
<b>10110 - Design and Implementation of a 1kW Photovoltaic System as a Training Infrastructure</b> .....	15875
<i>F. Yildiz, K. Coogler</i>	
<b>9198 - A Practical Approach to the Carnot Efficiency</b> .....	15888
<i>D. Zietlow</i>	
<b>8818 - Revitalizing Engineering Education through Practical Applications of Advanced Energy Systems</b> .....	15900
<i>R. Falkenstein-Smith, J. Ahn, K. Wang</i>	
<b>9679 - University of XXX-Solar Radiation Clearness and Variability Index</b> .....	15911
<i>J. Ramos, J. Valladares</i>	

**W142 – FPD 8: TEACHING DESIGN IN THE FIRST YEAR**

<b>9724 - Examining the Engineering Design Process of First-Year Engineering Students During a Hands-on, In-class Design Challenge</b> .....	15924
<i>J. Swenson, M. Portsmouth, E. Danahy</i>	
<b>9120 - Assessing Knowledge and Application of the Design Process</b> .....	15943
<i>A. Saterbak, T. Volz</i>	
<b>8661 - A First Year Course Based on Conceptual Design</b> .....	15956
<i>J. Bates</i>	
<b>9854 - First-year Product Design Challenge: Creative Design Development for the Disabled</b> .....	15970
<i>W. Catanach III, M. Brannon, C. Smith</i>	

**W144 – INDUSTRIAL ENGINEERING DIVISION TECHNICAL SESSION 1**

<b>8784 - Introducing Flexibility in an Engineering Curriculum Through Student Designed Elective Programs</b> .....	16013
<i>W. Schell, D. Claudio, D. Sobek II, L. Stanley, N. Ward</i>	
<b>9161 - The Effect of Active Collaborative Learning on Instructor Evaluations: An Observational Study</b> .....	16021
<i>T. Lynch-Caris</i>	
<b>9590 - Designing Industrial Engineering Course Content and Delivery with an Understanding of the Learning Preferences and Factors Driving Satisfaction of Undergraduate Industrial Engineering Students</b> .....	16033
<i>P. Lynch, C. Bober, J. Mines</i>	

**W146 – INTERNATIONAL DIVISION TECHNICAL SESSION 7**

<b>8948 - Establishing an Immersive Cross-Cultural Experiential Learning and Design Collaboration for Engineering Students and Faculty</b> .....	16050
<i>G. Warnick, Y.-S. Wong, B. Jensen, S. Magleby, G. Roach</i>	
<b>9307 - Assessing Interactions Among Students Geographically Disperse During Multinational Design Projects</b> .....	16059
<i>I. Esparragoza, S. Farak, J. Ocampo, R. Vigano, J. Duque-Rivera, C. Rodriguez</i>	
<b>9222 - Experiences of International and Domestic Students in the First Two Years of Undergraduate Engineering Programs</b> .....	16071
<i>I. Mena, T. Litzinger, S. Zappe</i>	

**W147 – K 12 OUTREACH AND OUT OF SCHOOL TIME ENGINEERING PROGRAMMING AND RESEARCH**

<b>8977 - Impact of a 5-Week Collegiate Level Residential STEM Summer Program on Secondary School Students (research to practice)</b> .....	16084
<i>B. Campbell, S. Robb, S. Abbott, S. Mutunga</i>	
<b>9005 - Lessons Learned Developing an Engaging Engineering Summer Camp</b> .....	16100
<i>K. Krapcho, C. Furse</i>	
<b>9683 - Stimulating an Interest in Engineering Through an "Explore Engineering and Technology" Summer Camp for High School Students</b> .....	16111
<i>A. Sala, P. Sitaram, T. Spendlove</i>	
<b>9936 - Engineering Camp: A Residential Experience Designed to Build Academic Capital in Pre-college Students</b> .....	16121
<i>E. Jablonski, M. Vigeant</i>	
<b>8903 - MISO (Maximizing the Impact of STEM Outreach Through Data-Driven Decision-Making): Building and Evaluating a Community of Practice</b> .....	16131
<i>T. Collins, E. Wiebe, P. Dyk</i>	



## **W147B – K 12 TEACHER PRE SERVICE AND UNDERGRADUATE INSTRUCTOR TRAINING**

<b>10907 - Pre-service STEM Educators' Perceptions of the Design Activities to Inform Educational Practice (Research to Practice - Strand: Other)</b> .....	16145
<i>M. Crehan, N. Seery, D. Canty, D. Lane</i>	
<b>9688 - Preparing Teachers and University Students to Translate Engineering Research to K8 Students in an After-school Program</b> .....	16158
<i>H. Greene, X. Zhan, A. Anthony, P. Post, A. Parkhurst</i>	
<b>8726 - Enhancing STEM Awareness for Pre-Service Teachers: A Recruitment Initiative</b> .....	16175
<i>R. Bachnak, S. Maldonado, G. Pinzon, R. Goonatilake</i>	

## **W152 – MANUFACTURING AND MACHINE COMPONENT DESIGN**

<b>8628 - Machining Experience in a Mechanical Engineering Curriculum</b> .....	16191
<i>S. Kiefer</i>	
<b>9099 - Integration of Manufacturing into Mechanical Engineering Education Curricula</b> .....	16201
<i>R. Mott, R. Bennett, M. Stratton, S. Danielson</i>	
<b>9476 - Role of Artifacts in Creating a Self-Renewing Design and Manufacturing Community of Practice</b> .....	16215
<i>S. Beyerlein, E. Odom, J. McCormack, D. Cordon</i>	
<b>10616 - Hands-On Method for Teaching Design of Mechanical Components Course</b> .....	16226
<i>H. Stalford</i>	

## **W171 – WIED: PRE COLLEGE STUDENT EXPERIENCES**

<b>8920 - Effects of Two Experientially-Correct Introduction To Engineering Modules on Prospective Female Engineering Students</b> .....	16247
<i>J. Volcy</i>	
<b>9208 - What Do Schoolgirls Think of Engineering? A Critique of Conversations from a Participatory Research Approach</b> .....	16258
<i>J. Andrews, R. Clark</i>	
<b>10539 - Increasing Female Participation in Engineering: Evaluating *CAMP NAME* Summer Camp</b> .....	16272
<i>J. McCormick, T. Talbert-Hatch, C. Feldhaus</i>	
<b>10692 - C-STEM Girls Computing and Robotics Leadership Camp</b> .....	16296
<i>S. Modekurty, J. Fong, H. Cheng</i>	
<b>9078 - Does Women-Targeted Recruiting Successfully Matriculate More Undergraduate Women into an Engineering College?</b> .....	16310
<i>A. Parker, B. Myers, J. Sullivan</i>	

## **W202 – AEROSPACE DIVISION TECHNICAL SESSION 3**

<b>9767 - Aerospace Partners for the Advancement of Collaborative Engineering</b> .....	16323
<i>S. Gorrell, C. Jensen, B. Stone, E. Red, M. Richey, F. Zender, M. Wright, D. French, S. Hayashibara, C. Johnson, J. Sullivan</i>	
<b>9351 - 21st Century Aviation Maintenance Training</b> .....	16350
<i>T. Michmerhuizen</i>	

## **W212 – IMPROVING INTRODUCTORY EXPERIENCES IN CHEMICAL ENGINEERING**

<b>9277 - Writing Abstracts of Homework Problem Solutions: Implementation and Assessment in a Material Balances Course</b> .....	16356
<i>K. Dahm, S. Farrell</i>	
<b>10575 - Studio-based Learning in Multiple Material/Energy Balance Classes</b> .....	16365
<i>R. Zollars</i>	
<b>9271 - Integrating Freshmen into Exploring the Multi-faceted World of Engineering and Sustainability through Biofuels Synthesis from Waste Cooking Oil</b> .....	16379
<i>L.-A. Chin, J. Satrio, K. Kroos</i>	
<b>8897 - Fostering the Development of Critical Thinking in an Introduction to Chemical Process Engineering Design Course</b> .....	16404
<i>G. Chavez-Torrejon, S. Husted, N. Ramirez-Corona, A. Lopez-Malo, E. Palou</i>	

## **W213 – RAISE THE BAR – VISIONS FOR THE FUTURE, BODIES OF KNOWLEDGE, AND ACCREDITATION VICISSITUDES**

<b>9270 - Visions of the Future of Engineering Education: Sharpening the Focus</b> .....	16421
<i>M. Killgore</i>	
<b>9110 - NSPE's Pan-Engineering BOK</b> .....	16438
<i>S. Welsh</i>	

9019 - Accreditation Issues of Strategic Importance to the Civil Engineering Profession .....	16469
<i>S. Ressler, T. Lenox</i>	

### **W216 – APPLICATIONS OF ONLINE COMPUTING**

10282 - Feasibility of Interactive eTextbooks with Computationally Intense Content .....	16495
<i>J. Richard, L. Collins, K. Shryock, J. Whitcomb, J. Angarita</i>	
8765 - Design of On-line Courses: Implications for Student Time Management .....	16513
<i>C. Goodson, S. Miertschin, B. Stewart</i>	
8702 - Strategies for Using On-line Practice Problems .....	16529
<i>J. Everett, K. Mallouk, J. Stanzione III, J. Morgan</i>	
8479 - Talking Teams: Increased Equity in Participation in Online Compared to Face-to-Face Team Discussions .....	16555
<i>R. Fowler</i>	

### **W217 – POTPOURRI**

10856 - Sequence Data Mining for Adverse Event Prediction and Action Recommendation .....	16567
<i>R. Sanati-Mehrizy, A. Minaie, R. Kuddus, A. Sanati-Mehrizy, P. Sanati-Mehrizy</i>	
10828 - A Unified Approach to Explain Thermo-fluid Science Concepts Using Interactive Molecular-level Simulations .....	16575
<i>J. Webb, I. Senocak, D. Yang</i>	
10829 - The Computer Software Compliance Problem .....	16588
<i>P. Knoke</i>	
9362 - A Visual and Engaging Approach to Learning Computer Algorithms .....	16595
<i>D. Raviv, Y. Nakagawa, G. Roskovich</i>	
10644 - Computer Engineering Program at Utah Valley University .....	16622
<i>A. Minaie, R. Sanati-Mehrizy, P. Sanati-Mehrizy, A. Sanati-Mehrizy</i>	
10639 - Wireless Sensor Networks Projects in a Computer Engineering Program .....	16633
<i>A. Minaie, R. Sanati-Mehrizy, P. Sanati-Mehrizy, A. Sanati-Mehrizy</i>	

### **W218 – CAPSTONE AND ONLINE COURSES IN CONSTRUCTION EDUCATION**

9499 - Capstone = Team Teaching + Team Learning + Industry .....	16647
<i>J. Jones, M. Mezo</i>	
10565 - Multidisciplinary Construction Engineering Design Projects .....	16654
<i>C. Turner, S. Reynolds</i>	
10171 - Strategies for Effective Online Course Development .....	16668
<i>C. Considine, M. Seek, J. Lester</i>	

## **VOLUME 20**

10583 - Workflow for Developing Online Content for Hybrid Classes .....	16675
<i>J. Mallen, C. Jahren, N. Koehler, A. Ilgu</i>	

### **W223 – DEED MELANGE**

9746 - Design Ability Assessment Technique .....	16690
<i>L. Osgood, C. Johnston</i>	
8810 - Using Standards-based Grading to Effectively Assess Project-based Design Courses .....	16703
<i>S. Atwood, M. Siniawski, A. Carberry</i>	
8847 - Introducing Sustainability into Engineering Design: a First Year Course .....	16713
<i>C. Pfluger, K. Grahame</i>	
9693 - Comparison of Questioning-based and Reasoning-based Design Approaches .....	16728
<i>A. Liu, S. Lu</i>	
10509 - Learning about Learning and Engineering: Engineers, Students, and Educators Co-Design Challenges for a Science Center .....	16749
<i>J. Wang, A. Agogino</i>	

### **W226 – IMPROVEMENTS IN ECE SIGNALS AND SYSTEMS**

9585 - Data Mining to Help Determine Sources of Difficulty in an Introductory Continuous-Time Signals and Systems Course .....	16778
<i>M. Simoni, F. Fayyaz, R. Streveler</i>	
9790 - Improving Conceptual Understanding of Signals and Systems in Undergraduate Engineering Students Using Collaborative In-Class Laboratory Exercises .....	16792
<i>A. Rao, J. Fan, C. Brame, B. Landman</i>	

<b>10633 - Ultra Low-Cost Software-Defined Radio: A Mobile Studio for Teaching Digital Signal Processing</b> .....	16806
<i>C. Prust, S. Holland, R. Kelhofer</i>	
<b>10796 - An Experiment to Enhance Signals and Systems Learning by Using Technology Based Teaching Strategies</b> .....	16819
<i>B. Verdin, R. Borries, P. Nava, A. Butler</i>	

### **W230 – SPATIAL ABILITY & VISUALIZATION TRAINING II**

<b>9578 - Information Visualization for Product Lifecycle Management (PLM) Data</b> .....	16832
<i>C. Guo, Y. Chen, C. Miller, N. Hartman, A. Mueller, P. Connolly</i>	
<b>9627 - Impact of Optional Supplemental Course to Enhance Spatial Visualization Skills in First-Year Engineering Students</b> .....	16847
<i>D. Grzybowski, O. Stavridis, L. Barclay, L. Abrams, S. Sorby, J. Thomas, J. Merrill</i>	
<b>9841 - Assessment of Students' Changed Spatial Ability Using Two Different Curriculum Approaches; Technical Drawing Compared to Innovative Product Design</b> .....	16863
<i>M. Snyder, M. Spenko</i>	
<b>9738 - Enhance Creative Thinking by Collaborating with Designers</b> .....	16872
<i>Y. Chen, Z. Qian</i>	

### **W232 – TEACHING APPROACHES FOR ETHICS**

<b>10721 - Learning about Ethics in a Multidisciplinary Context</b> .....	16885
<i>R. Raridon, R. Bates, D. Nykanen, M. Hart, W. Sealy</i>	
<b>9425 - Understanding of Social Responsibility by First Year Engineering Students: Ethical Foundations and Courses</b> .....	16897
<i>G. Rulifson, A. Bielefeldt, W. Thomas</i>	
<b>8857 - Developing Engineering Ethics through Expert Witness Role Plays</b> .....	16924
<i>B. Brummel, J. Daily</i>	

### **W241 – SUSTAINABILITY AND HANDS ON ENGINEERING EDUCATION**

<b>8583 - Examining Water Quality in the Chesapeake Bay: A Hands-on Sustainability Activity for 5th to 7th Graders</b> .....	16937
<i>B. Striebig, S. Holland</i>	
<b>9574 - Distinctive and Unique Outreach Programs: Promoting Academic Excellence and Diversity</b> .....	16946
<i>P. Monaco, A. Morse</i>	
<b>8870 - A GIS-based Atmospheric Dispersion Modeling Project for Introductory Air Pollution Courses</b> .....	16958
<i>A. Pfluger, P. Dacunto, M. Hendricks</i>	

### **W242 – FPD 9: FIRST YEAR PROJECTS**

<b>10158 - Energy Scavenging - An Introductory Engineering Project</b> .....	16973
<i>S. Moor, S. Heindel, Y. Liu</i>	
<b>8710 - Use of the National Academy of Engineering's Grand Challenges for Engineering as a semester-long project for an Introduction to Engineering Course</b> .....	16989
<i>L. Corneal</i>	
<b>8880 - A First-year Soldering and Analog Music to Light Modulator Electronics Lab Project</b> .....	16997
<i>T. Shepard, B. Carlin</i>	
<b>10501 - Engaging Computer Engineering Freshmen through a Voluntary Competitive Team Project with Mentoring</b> .....	17013
<i>R. Melton, S. Yang, A. Becker-Gomez</i>	

### **W244 – INDUSTRIAL ENGINEERING DIVISION TECHNICAL SESSION 2**

<b>9591 - A New Look at Involving Undergraduate Students, Real Life Applications, and Active Learning Activities in the Industrial Engineering Undergraduate Course Delivery Process</b> .....	17024
<i>P. Lynch, J. Wilck Iv, C. Bober, J. Mines</i>	
<b>9643 - Rounding-up the Industrial Engineering Educational Profile with Adaptive Soft Skills Framed by a Cultural Competency Approach in an Industry-University Partnership</b> .....	17039
<i>I. Olague-Caballero, D. Valles-Rosales</i>	
<b>10084 - Toward Broadening Participation: Understanding Students' Perceptions of Industrial Engineering</b> .....	17055
<i>V. Rito, J. Aschenbrenner, J. Stamm</i>	
<b>10845 - From Classroom to Online to Hybrid: The Evolution of an Operations Management Course</b> .....	17066
<i>L. Pohl, E. Pohl</i>	

## **W246 – INTERNATIONAL DIVISION TECHNICAL SESSION 8**

<b>8817 - Is Engineering Education Research Global? The Answer May Surprise You.</b> .....	17080
<i>B. Williams, P. Wankat, P. Neto, C. Tiago</i>	
<b>8758 - A History of Engineering Education Research in Portugal and Ireland</b> .....	17088
<i>S. Sorby, B. Williams, J. Oliveira, G. Duffy, D. Brabazon</i>	

## **W247 – DIVERSITY IN K 12 AND PRE COLLEGE ENGINEERING EDUCATION**

<b>8956 - Including Children With Disabilities in STEM: An Outreach Program for Dyslexic Students (Research to Practice)</b> .....	17095
<i>L. Wright, B. Moskal</i>	
<b>9830 - Viewing Student Engineering Through the Lens of "Engineering Moments": An Interpretive Case Study of 7th Grade Students with Language-based Learning Disabilities</b> .....	17107
<i>J. Scolnic, K. Spencer, M. Portsmouth</i>	
<b>8694 - Developing a Summer Engineering Program for Improving the Preparation and Self-Efficacy of Underrepresented Students</b> .....	17130
<i>A. Enriquez, W. Pong, N. Ozer, H. Mahmoodi, H. Jiang, C. Chen, H. Shahnasser, N. Rentsch</i>	
<b>9703 - Funds of Knowledge in Hispanic Students' Communities and Households that Enhance Engineering Design Thinking</b> .....	17153
<i>J. Mejia, A. Wilson, C. Hailey, I. Hasbun, D. Householder</i>	

## **W247B – IMPACTS ON K 12 STUDENT IDENTITY, CAREER CHOICE AND PERCEPTIONS OF ENGINEERS**

<b>9370 - Middle School Curricular Materials on Grand Challenges for Engineering: Impact on Efficacy and Expectancy Beliefs</b> .....	17173
<i>K. Howard, J. Diestelmann, T.-L. Huang, L. Aneskavich, K. Cheng, B. Crary, J. Demerit, T. Mayeshiba, A. Schiebel, S. Hagness, S. Cramer, A. Wendt</i>	
<b>9024 - Boys and Girls Engineering Identity Development in Early Elementary Before and After Hands-On Engineering Learning Classroom Experiences</b> .....	17186
<i>K. Douglas, B. Mihalec-Adkins, H. Diefes-Dux</i>	
<b>9828 - High School Students' Attitudes to Engineering and Engineers Related to their Career Choice</b> .....	17194
<i>A. Depieri, R. Lopes</i>	
<b>10803 - Does Teaching Matter? Factors that Influence High School Students' Decisions Whether to Pursue College STEM Majors</b> .....	17211
<i>G. Lichtenstein, M. Tombari, S. Sheppard, K. Storm</i>	
<b>10677 - Maybe I am Interested in Engineering, Does that Matter?</b> .....	17229
<i>C. Carrico, H. Matusovich, M. Paretti, M. Boynton</i>	

## **W248 – TEACHING COMMUNICATION II**

<b>8823 - Incorporating Oral Presentations into Electrical and Computer Engineering Design Courses: A Four-Course Study</b> .....	17248
<i>N. Bousaba, J. Conrad, J. Coco, M. Miri, R. Cox</i>	
<b>9303 - Effect of Student Model Presentations from a Speaking Contest on the Development of Engineering Students as Speakers</b> .....	17269
<i>M. Overbaugh, M. Alley, C. Haas</i>	
<b>9522 - Final Results of Reliability Testing for the Norback-Utschig Presentation Scoring System and Implications for Instruction</b> .....	17282
<i>J. Norback, T. Utschig, A. Bonifonte, G. Ross</i>	
<b>9549 - Work-in-Progress: Undergraduate Teaching and Research Experiences in Engineering (Utree): An Engineering Student Organization with a Communication Focus</b> .....	17300
<i>V. Vadyak, M. Alley, J. Garner, C. Haas</i>	
<b>9686 - Long-distance Collaboration, International Perspective, and Social Responsibility Through a Shared Interdisciplinary Engineering Design Course</b> .....	17314
<i>J. Prosis, H. Yochum</i>	

## **W249 – BEST PRACTICES AND LESSONS LEARNED IN CAPSTONE DESIGN PROJECTS**

<b>8411 - Industry Based Senior Projects and the Four Pillars of Manufacturing Engineering</b> .....	17325
<i>C. Pung, H. Jack</i>	
<b>8489 - Interdisciplinary Capstone Projects</b> .....	17334
<i>A. Sirinterlikci</i>	
<b>9229 - NKU-Mazak Corp. Joint Senior Project Program</b> .....	17345
<i>M. Sadat-Hossieny, M. Torres</i>	
<b>10225 - Interdisciplinary Senior Design Project to Develop a Teaching Tool: Dragon Conductive 3D Printer</b> .....	17352
<i>Y. Ertekin, I. Husanu, R. Chiou, J. Konstantinos</i>	

<b>10293 - Effective Capstone Project in Manufacturing Design Engineering Program</b> .....	17361
<i>S. Viswanathan, G. Bright</i>	

**W255 – MULTIDISCIPLINARY CAPSTONE DESIGN**

<b>8599 - CubeSat: A Multidisciplinary Senior Design Project</b> .....	17382
<i>A. Kaplan, J. Flynn, S. Katz</i>	
<b>10356 - Enabling Institute-wide Multidisciplinary Engineering Capstone Design Experiences</b> .....	17399
<i>A. Jariwala, S. Vaish, D. Rosen</i>	
<b>9523 - Expanding and Improving the Integration of Multidisciplinary Projects in a Capstone Senior Design Course: Experience Gained and Future Plans</b> .....	17411
<i>M. Frank, K. Amin, O. Okoli, S. Jung, R. Engelen, C. Shih</i>	
<b>10095 - Satellite Design for Undergraduate Senior Capstone</b> .....	17432
<i>J. Emison, K. Yoshino, S. Straits, H. Voss</i>	
<b>10701 - Integrated Capstone Design in Architectural Engineering Curriculum</b> .....	17459
<i>A. Megri</i>	

**W256 – TRICKS OF THE TRADE**

<b>10921 - Improving Student Engagement in Online Courses</b> .....	17476
<i>M. Sarder</i>	
<b>8986 - Active Learning Techniques and Online Tools Applied to the Educational Experience of 2nd Year Materials Science and Engineering Students</b> .....	17493
<i>J. Carter, B. Yuhnke Jr.</i>	
<b>10303 - Pedagogy Including Differentiated Instruction That Enables Student Learning</b> .....	17511
<i>J. Marshall, C. Blue</i>	
<b>10923 - Flipping the Engineering Classroom: Results and Observations with Non-Engineering Students</b> .....	17522
<i>S. Chetcuti, H. Thomas, B. Pafford</i>	
<b>8576 - Please Play with your Phones - Using Student-Owned Personal Electronics to Enhance In Class Activities</b> .....	17543
<i>B. Smyser</i>	

**VOLUME 21**

<b>10102 - Creating Small Interactive Teaching Development Groups</b> .....	17558
<i>M. Hjalmarson, J. Nelson</i>	

**W265 – SD TECHNICAL SESSION: TRICKS OF THE TRADE**

<b>8556 - Engaging ASEE Student Membership through the Creation of a Student-Inclusive ASEE Conference Program</b> .....	17564
<i>G. Rathore, A. Coso, A. Carberry</i>	
<b>8548 - Engineering Education Ph.D. Students: Where Are They Now And What Was The Job Search Process Like?</b> .....	17575
<i>R. Kajfez, C. Croyle, A. Snyder, M. Mohammadi-Aragh</i>	
<b>9623 - Effective Educational Methods for Teaching Assistants in a First-Year Engineering MATLAB® Course</b> .....	17590
<i>J. Heeg, K. Flenar, J. Ross, T. Okel, T. Deshpande, G. Bucks, K. Ossman</i>	
<b>8913 - What's Stopping Them? Perspectives of Teaching Assistants on Incorporating Diverse Teaching Methods</b> .....	17605
<i>M. Grady, R. Gergely</i>	
<b>10173 - Connecting Research to Action: A Useful Procedure</b> .....	17621
<i>J. Turns, B. Sattler, K. Mobrand, D. Paine</i>	

**W271 – WIED: MEDLEY**

<b>10322 - When, Why, How, Who - Recruitment Lessons from First Year Engineering Students in the Millennial Generation</b> .....	17642
<i>J. Lehr, H. Finger, A. Snelling</i>	
<b>8475 - Filtered Gender Diversity Pathways for Domestic and International Doctoral Graduates of United States Electrical Engineering (EE), Computer Engineering (CompE) and Electrical and Computer Engineering (ECE) Programs</b> .....	17673
<i>K. Bowman</i>	
<b>9785 - Attracting and Retaining Women in Undergraduate Engineering Programs - A Case Study</b> .....	17686
<i>A. Imran, M. Kalil, F. Hayati</i>	
<b>10053 - Highlighting the Need for Engineering Education for Females in Saudi Arabia</b> .....	17693
<i>A. El-Sherbeeny</i>	
<b>10546 - Identifying Successful Interpersonal Communication Strategies for Women in Masculine Settings</b> .....	17701
<i>J. Wolfe, B. Powell</i>	

## **W413 – TOPICS RELATED TO CIVIL ENGINEERING CURRICULUM**

<b>8529 - Critical Thinking in the Curriculum: Making Better Decisions</b> .....	17715
<i>S. Mattingly, Y. Weatheron, A. Kruzic, H. Frost, Z. Rahman</i>	
<b>8717 - Using Sponsored Design Projects to Strengthen Professional Practice Curriculum Components in Civil Engineering Capstone</b> .....	17729
<i>J. Nelson, E. Hollenbaugh, M. Borup</i>	
<b>9056 - Creation of a Co-Terminal BS/MS Civil Engineering Degree Program</b> .....	17740
<i>C. Riley, R. Lindgren, S. Clair, D. Thaemert, M. Sleep</i>	

## **W416 – COMPUTER BASED LEARNING MODELS**

<b>8854 - Poll Everywhere! Even in the Classroom: An Investigation Into the Impact of Using PollEverywhere in a Large-lecture Classroom</b> .....	17758
<i>W. Kappers, S. Cutler</i>	
<b>8423 - A Real-Time Model to Assess Student Engagement during Interaction with Intelligent Educational Agents</b> .....	17770
<i>L. Brown, A. Howard</i>	
<b>9256 - Attention Management as a Fundamental Aspect of 21st Century Technology Literacy: A Research Agenda</b> .....	17781
<i>M. Vorvoreanu</i>	
<b>8670 - Experiences with Electric Circuit Analysis in a Blended Learning Model</b> .....	17794
<i>M. Morrow</i>	

## **W418 – CONSTRUCTION CONTRACTS, LAW AND ETHICS**

<b>8940 - Comparative Analysis between AIA and DBIA Contract Documents:</b> .....	17811
<i>M. Miller, C. Puerto, R. Valdes-Vasquez, K. Strong</i>	
<b>9555 - The Transformation of a Construction Contracts Administration Class</b> .....	17823
<i>J. Cloara, D. Kashiwagi, S. Romero, K. Sullivan</i>	
<b>10116 - Construction Contract Language; a Growing Impediment to Trust and Cooperation</b> .....	17840
<i>B. Loss</i>	
<b>10875 - Investigating Students' Understanding of the Relationship Between Academic Integrity and Professional Integrity in Construction</b> .....	17856
<i>N. Tymvios, J. Hildreth</i>	

## **W425 – CHOICE AND PERSISTENCE IN ENGINEERING EDUCATION AND CAREERS**

<b>9082 - Do Engineers Beget Engineers? Exploring Connections Between the Engineering-related Career Choices of Students and their Families</b> .....	17866
<i>A. Godwin, G. Potvin, Z. Hazari</i>	
<b>10554 - Parents As Critical Influence: Insights from Five Different Studies (Other)</b> .....	17882
<i>B. Dorie, T. Jones, M. Pollock, M. Cardella</i>	
<b>10722 - “Engineering Beats You Up”: Problems with Relying on the Bell Curve</b> .....	17895
<i>J. Wolfe, B. Powell</i>	
<b>10378 - Student Interest in Engineering and Other STEM Careers: School-Level, Gender, Race/Ethnicity, and Urbanicity</b> .....	17909
<i>A. Unfried, Malinda Faber, E. Wiebe</i>	
<b>9430 - Beginning to Quantify the Pool of Engineering-Eligible Prospective Students through a Survey of Access Practices</b> .....	17936
<i>B. Myers, J. Sullivan</i>	
<b>9392 - Exploring the Effects of Student Course Withdrawals on Time to Graduation</b> .....	17949
<i>G. Nicholls, R. Gaede</i>	

## **W426 – ECE DISTANCE EDUCATION**

<b>8664 - Development of On-Line Lecture and Preparation Resources for Electrical Engineering Laboratory Courses</b> .....	17961
<i>S. Schneider, J. Richie</i>	
<b>9433 - Three Pilot Studies with a Focus on Asynchronous Distance Education</b> .....	17974
<i>D. Buechler, P. Sealy Jr., J. Goomey</i>	
<b>10217 - Use of a MOOC Platform to Blend a Linear Circuits Course for Non-Majors</b> .....	17994
<i>B. Ferri, D. Majerich, N. Parrish, A. Ferri</i>	
<b>10564 - Improving Student Learning of Basic Electronic Circuits Concepts using Web-Based Tools</b> .....	18009
<i>Z. Aliyazicioglu, S. Sujanani, J. Kuo</i>	

### **W435 – STUDENT CENTERED INFORMATION LITERACY**

<b>9576 - First Year and Junior Engineering Students' Self-Assessment of Information Literacy Skills</b> .....	18020
<i>K. Douglas, R. Wertz, M. Fosmire, S. Purzer, A. Epps</i>	
<b>10887 - Identifying Challenges Faced by Chinese Undergraduate Engineering Students in Acquiring Information Literacy Skills - A Report on Survey Findings</b> .....	18030
<i>J. Zhao, T. Mawhinney</i>	
<b>10886 - The 360° of Information Fluency Delivery to Freshman Engineering Students</b> .....	18061
<i>M. Armour-Gemmen, R. Hensei, M. Strife</i>	

### **W444 – INDUSTRIAL ENGINEERING TECHNICAL SESSION**

<b>10166 - Flipping Engineering Probability and Statistics - Lessons Learned for Faculty Considering the Switch</b> .....	18078
<i>R. Olson</i>	
<b>10191 - Project Management Learning Takes Flight</b> .....	18093
<i>V. Townsend, J. Urbanic</i>	
<b>10590 - Aren't Units Part of the Problem?</b> .....	18109
<i>M. Carr</i>	

### **W446 – INTERNATIONAL DIVISION TECHNICAL SESSION 9**

<b>8887 - Global Competency: Are Engineering Students Ready?</b> .....	18123
<i>S. Billis, N. Anid, M. Panero</i>	
<b>9384 - Exploring Engineering Education in Broader Context: A Framework of Engineering Global Preparedness</b> .....	18144
<i>S. Streiner, S. Cunningham, S. Huang, S. Levonisova, C. Matherly, M. Besterfield-Sacre, L. Shuman, G. Ragusa, D. Kotys-Schwartz</i>	
<b>9405 - Moving Towards a Research Informed Conceptual Model of Engineering Global Preparedness</b> .....	18156
<i>S. Levonisova, S. Huang, S. Streiner, S. Cunningham, G. Ragusa, M. Besterfield-Sacre, L. Shuman, C. Matherly</i>	

### **W447 – ADDRESSING THE NGSS, PART 3 OF 3: SUPPORTING HIGH SCHOOL SCIENCE TEACHERS IN ENGINEERING PEDAGOGY AND ENGINEERING SCIENCE CONNECTIONS**

<b>9396 - Using Innovation Configuration Mapping for the Implementation of Engineering Infused Science Lessons (research to practice)</b> .....	18173
<i>J. Ross, J. Daugherty, R. Custer</i>	
<b>9403 - Infusing Engineering Concepts into Science: Findings from a Professional Development Project (Research to Practice)</b> .....	18182
<i>R. Custer, J. Ross, J. Daugherty</i>	
<b>9542 - The Enrichment Experiences in Engineering (E3)</b> .....	18198
<i>R. Autenrieth, C. Page, K. Butler-Purry, C. Lewis</i>	
<b>8438 - PLAY Minecraft! Assessing Secondary Engineering Education Using Game Challenges Within a Participatory Learning Environment</b> .....	18216
<i>E. Shaw, M. La, R. Phillips, E. Reilly</i>	
<b>9622 - ENGR 102 for High School: An Introduction to Engineering, AP Type Course Taught in High Schools by High School Teachers</b> .....	18226
<i>J. Rogers, B. Vezino, J. Baygents, J. Goldberg</i>	

### **W447B – K 12 AND PRE COLLEGE ENGINEERING: EDUCATIONAL POLICY AND RESEARCH**

<b>9191 - Time for Action? Elementary Engineering Education - Challenging Teachers, Policy Makers and Parents</b> .....	18245
<i>R. Clark, J. Andrews</i>	
<b>8974 - Integration in K-12 STEM Education: Status, Prospects, and an Agenda for Research</b> .....	18257
<i>M. Nathan, G. Pearson</i>	

### **W448 – ENGINEERING & OUR GLOBAL SOCIETY**

<b>9793 - Emergence of Engineering as a Discipline in Modern China: Separation of Confucian Liberal Learning from Technique</b> .....	18274
<i>W. Wang, M. Li, B. Jesiek, Q. Zhu, J. Yuan, Q. Lei</i>	
<b>10251 - Study Abroad as a Means to Achieving ABET Criterion 3 Outcomes: A Case Study in Course Design and Assessment</b> .....	18285
<i>K. Neeley</i>	
<b>10651 - Developing Curriculum to Prepare Student Engineers to Engage with Problems Faced by Underserved Communities Globally</b> .....	18294
<i>B. Hariharan</i>	

<b>10926 - The Fusion and Conflict Between Engineering Education and General Education in China After 1949</b> .....	18309
<i>Z. Zhang, X. Tang</i>	

**W466 – SYSTEMS ENGINEERING DIVISION TECHNICAL SESSION 4**

<b>8983 - Preparing Our Graduates to be More Effective Leaders In a World of Systems-Oriented Risk</b> .....	18324
<i>E. Adrijcic, W. Schindel, C. Downing</i>	
<b>9443 - Introducing the Fundamentals of Systems Engineering to Freshman through Various Interactive Group Activities</b> .....	18340
<i>M. Brannon, Z. Szajnfarber, T. Mazzuchi</i>	
<b>9577 - Agile Development Process of a Web-Based Application to Improve Retention of Hispanic STEM Students</b> .....	18363
<i>P. Biswas, R. Lin</i>	
<b>9122 - lectureLess: A Mobile Cloud Computing Approach to Near Real-time Teaching Assessment</b> .....	18382
<i>S. Henderson, K. McDonald</i>	

**W470 – CALIFORNIA ON THE MOVE: A ROBUST ARRAY OF STUDENT SUCCESS INITIATIVES**

<b>9202 - The STEM Center: Creating a Model for Success in Community College STEM Education</b> .....	18398
<i>A. Camacho, D. Lapuz</i>	
<b>8693 - Enhancing the Success of Minority STEM Students by Providing Financial, Academic, Social, and Cultural Capital</b> .....	18414
<i>A. Enriquez, C. Lipe, B. Price</i>	

**VOLUME 22**

<b>9033 - Programs to Enhance Retention and Success of Students Enrolled in Two-year College Engineering Programs</b> .....	18429
<i>C. Hasell, C. Burwell-Woo, A. Enriquez</i>	
<b>10207 - Improving Engineering Curriculum and Enhancing Underrepresented Community College Student Success through a Summer Research Internship Program</b> .....	18440
<i>N. Rentsch, A. Enriquez</i>	
<b>9779 - The Influence of Summer Research Experiences on Community College Students' Efficacy and Pursuit of a Bachelor's Degree in Science and Engineering</b> .....	18461
<i>S. Artis, C. Amelink</i>	

**W471 – WIED: CURRICULAR UNDERGRADUATE STUDENT PROGRAMS**

<b>9152 - Summer Diversity Program Enhances Female and Underrepresented Minority Student Academic Performance and Retention in the Drexel University College of Engineering</b> .....	18472
<i>A. Erickson-Ludwig, A. Clyne</i>	
<b>9436 - Correlating Freshman Engineers' Performance in a General Chemistry Course to Their Use of Supplemental Instruction</b> .....	18483
<i>K. Coletti, E. Wisniewski, R. Shapiro, P. Dimilla, R. Reisberg, M. Covert</i>	
<b>10039 - Effective Teamwork among Female Emirati Students</b> .....	18505
<i>J. Mohammed, N. Pashasaidi</i>	
<b>10398 - Why Am I Learning This? Using Everyday Examples in Engineering to Engage Female (And Male) Students in the Classroom</b> .....	18517
<i>T. Nilsson</i>	
<b>10787 - Cultivating Undergraduate Success in STEM Field</b> .....	18532
<i>L. Ononye</i>	

**W513 – INNOVATIVE PEDAGOGY AND ASSESSMENT IN CIVIL ENGINEERING EDUCATION**

<b>8469 - Going Out on a Limb: Using Poetry to Reinforce Civil Engineering Concepts</b> .....	18540
<i>B. Barry</i>	
<b>9308 - Assessment Results: Incorporating Case Studies in the Civil Engineering Curriculum</b> .....	18555
<i>N. Delatte, J. Bagaka</i>	
<b>10791 - Goethals' Infrastructure Challenge Part 2: The Challenge Begins</b> .....	18565
<i>B. Spittka, E. Wright, S. Hart, E. Hansen</i>	
<b>9330 - Assessment of Systems Learning in an Undergraduate Civil Engineering Course using Concept Maps</b> .....	18580
<i>M. Roberts, C. Haden, M. Thompson, P. Parker</i>	



## **W515 – IMPACT OF COMMUNITY ENGAGEMENT ON COMMUNITIES**

<b>9898 - Motivation of Community Partners and Advisors to Participate in Community Engagement Engineering Programs</b> .....	18598
<i>J. Thompson, B. Jesiek</i>	
<b>9309 - Bringing Healthcare to Rural Ghana: The Impact on Engineering Education</b> .....	18611
<i>A. Kubicki, L. Lynch, R. Warrington Jr.</i>	
<b>9326 - Application of Sustainable Solutions in International Service-Learning Engineering Projects</b> .....	18620
<i>C. Rodriguez, M. Soto, R. Dzwonczyk, J. Merrill, H. Greene, M. Cater</i>	
<b>9572 - Introduction to STEM Fields Through Robotics: A Synergetic Learning Experience for Students and Their Parents</b> .....	18638
<i>G. Pinzon, J. Huerta</i>	
<b>9717 - Community Engagement in the Developing World</b> .....	18646
<i>W. Jordan</i>	

## **W516 – COMPUTERS IN EDUCATION GENERAL TECHNICAL SESSION 2**

<b>10612 - A Bus Tracking and Planning System for CTfastrak</b> .....	18659
<i>S. Wu, S. Carroll, K. Boyd-Carter, J. Krostoski</i>	
<b>8719 - Using MIT App Inventor in an Emergency Management Course to Promote Computational Thinking</b> .....	18670
<i>H. Shih, J. Jackson, C. Wilson, P.-C. Yuan</i>	
<b>9007 - Collaborative Education: Building a Skilled Software Verification and Validation User Community</b> .....	18680
<i>S. Acharya, P. Manohar, W. Schilling Jr., A. Ansari, P. Wu</i>	
<b>9118 - FPAvisual: A Tool for Visualizing the Effects of Floating-Point Finite-Precision Arithmetic</b> .....	18691
<i>Y. Gu, N. Onder, C.-K. Shene, C. Wang</i>	

## **W518 – CONSTRUCTION MATERIALS AND TECHNOLOGIES**

<b>9291 - Introducing Building Information Modeling Course into a Newly Developed Construction Program with Various Student Backgrounds</b> .....	18710
<i>R. Liu, Y. Hatipkarasulu</i>	
<b>10925 - Impact of Quantity Takeoff Software on Student Performance in a University Construction Estimating Course: A Case Study</b> .....	18718
<i>J. Smithwick, J. Mischung, K. Sullivan</i>	
<b>10444 - Unmanned Aerial Vehicle Applications and Issues for Construction</b> .....	18729
<i>N. Opfer, D. Shields</i>	
<b>10464 - The Most Affordable Solar Decathlon House. Ever</b> .....	18745
<i>E. Schmeckpeper, M. Puddicombe, M. Lutz, J. Mountain, J. Pattetson</i>	
<b>9280 - Developing a Statistical Model for Building Settlement Prediction</b> .....	18763
<i>J. Du, S. Gunhan</i>	

## **W525 – STUDENT LEARNING, PROBLEM SOLVING, & CRITICAL THINKING 2**

<b>9806 - Practical, Authentic and Sustainable Development and Assessment of Critical Thinking in Engineering Through Model Eliciting Activities</b> .....	18776
<i>J. Kaupp, B. Frank</i>	
<b>9382 - A Thematic Analysis on Critical Thinking in Engineering Undergraduates</b> .....	18793
<i>A. Bumbaco, E. Douglas</i>	
<b>8586 - Advanced Student-Centric Learning Practices in Applied Engineering Programs</b> .....	18802
<i>B. Radhakrishnan</i>	
<b>10737 - Critical Thinking, Reflective Practice, and Adaptive Expertise in Engineering</b> .....	18818
<i>N. Hicks, A. Bumbaco, E. Douglas</i>	

## **W526 – STEM AND ECE**

<b>8930 - Innovative Engineering Outreach: Capacitive Touch Sensor Workshop</b> .....	18835
<i>B. Pirtle, C. Davis, J. Ruyle</i>	
<b>9872 - Online Student Support Services for STEM Courses in New Mexico: A Cross-Institutional Approach</b> .....	18846
<i>J. Luna, T. Schroeder, G. Heileman, C. Abdallah, J. Crichigno, I. Hurtado, A. Perez</i>	
<b>9901 - Development of a Fundamentals of Electrical and Computing Systems Course for In-service K-12 Teachers.</b> .....	18863
<i>K. Nepal, A. Tubesing</i>	
<b>10374 - Developing and Implementing Effective Instructional Strategies in STEM</b> .....	18880
<i>K. Ghadiri</i>	

### **W542 – FPD 10: TEAMWORK**

8444 - Evolution of Student Attitudes Toward Teamwork in a Project-based, Team-based First Year Introductory Engineering Course.....	18896
<i>L. Alford, R. Fowler, S. Sheffield</i>	
8516 - First-Year Engineering Team Responses to Feedback on Their Mathematical Models - A Video Study.....	18910
<i>O. Hanoglu, A. Horvath, H. Diefes-Dux</i>	
10128 - Improving Learning Productivity and Teamwork Skills in Freshman Engineering Students Through Conative Understanding.....	18934
<i>E. Adams, C. Antaya, T. Seager, A. Landis</i>	
9652 - Restructuring Teamwork Pedagogy in a First-year Engineering Design Program: Lessons Learned and Future Plans.....	18947
<i>D. Gatchell, B. Ankenman, P. Hirsch, A. Goodman, K. Brown</i>	

### **W547 – K 12 AND PRECOLLEGE ENGINEERING: RESEARCH ON TEACHERS' PERCEPTIONS, ATTITUDES AND IMPACTS OF TEACHER PD**

9672 - "Engineering Teaches Problem Solving": Teachers' Perceptions of Student Learning Through Engineering Lessons.....	18959
<i>A. Rynearson, K. Douglas, H. Diefes-Dux</i>	
10969 - The Attitudes of Elementary Teachers towards Elementary Engineering (research to practice).....	18969
<i>C. Lachapelle, J. Hertel, M. Shams, C. Antonio, C. Cunningham</i>	
8746 - Where do We Go from Here? Conversations with K-6 Principals Following Three Years of Engineering Education Professional Development for Their Faculty.....	18993
<i>L. Nadelson, J. Callahan</i>	

### **W548B – ENGINEERING AS PROFESSIONAL CALLING**

9903 – Engineering and Engineering Education as Spiritual Vocations.....	19023
<i>J. Thompson, M. Chua, C. Joslyn</i>	
8896 - Engineering Education Policymaking in Cross-National Context: A Critical Analysis of Engineering Education Accreditation in China.....	19034
<i>Q. Zhu, B. Jesiek, J. Yuan</i>	
9632 - Engineering Habits of the Mind - an Undergraduate Course That Asks: “What is it That Makes Someone an Engineer?” and “What Distinguishes Engineers from Other Professionals?”.....	19051
<i>J. Ledoux, J. Borinski, K. Haight, E. McCormick, A. Waller</i>	

### **W571 – FROM INDUSTRY TO ACADEMY FEMALE FACULTY BOUNDARY SPANNERS OFFERING AND GAINING PERSPECTIVE**

10468 - Panel: Faculty of Practice: Female Faculty Boundary Spanners Offering & Gaining Perspective.....	19075
<i>M. Pilote, D. Bairaktarova, R. Kafjez</i>	

### **W613 – INNOVATIVE ASSESSMENT TECHNIQUES IN CIVIL ENGINEERING COURSES**

8445 - Integration of Information Technology Software in a Civil Engineering Program - Learning Styles Considered.....	19077
<i>N/A</i>	
10410 - Using a Sustainable Infrastructure Rating System in the Civil Engineering Capstone Design Course.....	19088
<i>S. Burian</i>	
10382 - Use of Concept Maps to Assess Student Sustainability Knowledge.....	19108
<i>M. Watson, J. Pelkey, C. Noyes, M. Rodgers</i>	
9000 - Team Grading in Capstone - What the Students Think When They Grade One Another.....	19126
<i>D. Dulaski</i>	

### **W625 – STUDENT LEARNING, PROBLEM SOLVING, & CRITICAL THINKING 3**

9658 - A Method for Adjusting Group-Based Grades.....	19137
<i>E. Wang, A.-M. Vollstedt</i>	
9661 - Actively Constructing Interactive Engineering Learning Environments.....	19147
<i>N. Pitterson, R. Streveler</i>	
9786 - Understanding Teaching Assistants' Assessment of Individual Teamwork Performance.....	19161
<i>P. Sheridan, D. Reeve, G. Evans</i>	
9483 - A Case for a Reform in Teaching Introductory, Fundamental Engineering Mechanics Courses.....	19173
<i>P. Boylan-Ashraf, S. Freeman, M. Shelley</i>	

<b>9939 - Understanding Team Ethical Climate Through Interview Data</b> .....	19189
<i>M. Feister, C. Zoltowski, P. Buzzanell, W. Oakes, Q. Zhu</i>	

**W626 – INNOVATIONS IN COMPUTER ENGINEERING COURSES**

<b>8459 - Using Practical Examples in Teaching Digital Logic Design</b> .....	19198
<i>J. Hoffbeck</i>	
<b>9432 - A Hierarchical Project-Based Introduction to Digital Logic Design Course</b> .....	19212
<i>B. Carroll, S. Gieser, D. Levine</i>	
<b>10087 - A Multiple-Access Message-Exchange Course Project for a Networking Course in a BS Computer Engineering Program</b> .....	19224
<i>E. Chandler, W. Barnekow</i>	
<b>10716 - The Forest and the Trees: Using an Appropriate Level of Library Abstraction for Microcontroller Instruction</b> .....	19238
<i>B. Jones, R. Reese, M. Mohammadi-Aragh</i>	

**W642 – FPD 11: CULMINATING CONSIDERATIONS**

<b>8789 - Multidimensional Assessment of Creativity in an Introduction to Engineering Design Course</b> .....	19249
<i>S. Husted, J. Gutierrez, N. Ramirez-Corona, A. Lopez-Malo, E. Palou</i>	
<b>9888 - Is There a Correlation between First Year Critical Thinking Assessment Test Performance and Retention among Civil Engineering Students?</b> .....	19266
<i>Y. Weatherston, A. Kruzic, S. Mattingly, Z. Rahman, H. Frost</i>	
<b>8699 - Capstone Project in a Freshman Solid Modeling Course</b> .....	19277
<i>J. Mirth, J. Iselin</i>	
<b>9666 - Impact of Computational Fluid Dynamics use in a First-Year Engineering Research Design Project on Future Performance in Fluid Mechanics</b> .....	19287
<i>N. Hird, D. Grzybowski</i>	
<b>Author Index</b>	