<table>
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<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>1:00-1:15pm</td>
<td>Welcome: Sara Stein Koch, Institute Fellow and Senior Associate for Institutional Support, Gardner Institute</td>
<td>Chapter Introduction: Andrew K. Koch, President and Chief Operations &amp; Innovation Officer, Gardner Institute</td>
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<td>1:15-2:15pm</td>
<td>Addressing Structural Inequities in University Curricula - Chaouki Abdallah, Executive Vice President for Research (EVPR) at Georgia Tech; Greg Heileman, Associate Provost for Student &amp; Academic Life at the University of Arizona</td>
<td>Structural inequities in university curricula are one manifestation of asymmetric information. The curricula are constructed in such a way to achieve certain goals such as accreditation or preparing graduates for the next phase of their careers, but their inner workings (e.g., curricula) are opaque to most students and their parents. Students with the appropriate means (college-educated parents, those with access to college counselors, etc.) can gain information that will help them prepare and navigate a specific curriculum despite its complexity. That leads to inequitable outcomes for those who are not able to access the relevant information to help them make informed and timely decisions. This is an unintended but nevertheless a real consequence of having overly complex curricula. In this talk we will first describe some measures that have been created to quantify the complexity of curricula. Next, we will describe how these curricular complexity metrics relate to student progress towards graduation. Then, we will provide a number of case students that demonstrate how curricular complexity contributes to structural inequities in higher education, as well as some of the steps that can be taken to mitigate these inequities.</td>
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<td>2:15-2:20pm</td>
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<td>2:20-2:50pm</td>
<td>Case Studies - Choose one of the following:</td>
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<td>• Using Curricular Analytics for Improvement of STEM Transfer Pathways - David E. Smith, Associate Provost, Curriculum and Assessment, New Mexico State University</td>
<td>Curricular structures play a fundamental role in providing equitable opportunities for underrepresented students. This presentation describes ongoing efforts to apply curricular analytics tools for the improvement of STEM transfer pathways within the five-campus New Mexico State University system. The curricular analysis includes complexity-based measures of degree progress, correlation of complexity and course outcome metrics, and consideration of limited instructional capacities at small, rural community college campuses. The analysis is used to identify (i), potential curricular modifications, and (ii) ways online instruction might optimally bridge between community college and main campus experiences.</td>
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<td>• Curriculum Complexity &amp; Equity Issues - Mitchell Colver, Vice President of Community Development/Professional Practice Professor, Civitas Learning &amp; Utah State University</td>
<td>When curricular degree maps are unnecessarily complex (containing a lot of prerequisite course relationships), student progression towards graduation can be slowed. Using analytics, we can assess the importance of this relationship and, where appropriate, reduce curricular complexity.</td>
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<td>• Addressing the Math Bottleneck: Impact on Access and Equity in Engineering - Nathan Klingbeil, Professor of Mechanical Engineering, Wright State University</td>
<td>The inability of incoming students to advance past the traditional first-year math prerequisite requirements is a primary cause of attrition in engineering programs across the country. Similar curricular bottlenecks exist in other STEM disciplines and across all of higher education. This case study will describe an NSF funded curriculum reform initiative at Wright State University to address math-related attrition in engineering. It will include a data-driven, longitudinal analysis of program impacts on student performance, perception and retention. It will also explore impacts on student motivation and self-efficacy, and how those impacts disproportionately benefit the success of underrepresented students in engineering.</td>
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<td>2:50-2:55pm</td>
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Case Studies - Choose one of the following:

- **Equity & Excellence: Using Curricular Analytics to Foster Reform** - Steven P. Dandaneau, Executive Director, Reinvention Collaborative, and Associate Provost, Colorado State University
  
  The Curricular Analytics Toolkit is a powerful means to advance analysis of institutional discrimination as well as, when and where it is documented, motivate structural and cultural change on behalf of student equity. This session will address both facets of the Toolkit's potential, but will emphasize change management strategies. How are colleges and universities around the United States using, or planning to use, Curricular Analytics to foster change, curricular and otherwise, on behalf of equity? What strategies seem especially promising? What challenges lie ahead?

- **Reducing Curricular Complexity to Increase Student Success** - Kyna Betancourt, Assistant Dean, Undergraduate Studies, University of South Florida
  
  Structural curricular complexity, the patterns and relationships between courses and their requisites (Heileman et al, 2018) can make it difficult for students to succeed. Engineering programs often require more than 120 credits which, with complex curricula, leave students a small margin for error. Curricular Analytics (Heileman et al, 2018) was used with the College of Engineering at the University of South Florida to analyze curricular complexity and bring three programs down to 120 credit hours, reduce their complexity and increase student success. We will focus on the process used to complete this work and how it positively impacts students.

- **Socially Just Curricular Design** - Laurel Pritchard, Vice Provost for Undergraduate Education, and Brent Drake, Vice Provost for Decision Support, University of Nevada, Las Vegas
  
  Since 2017, UNLV has participated in a curricular re-design project funded by the Teagle Foundation and led by the Association of American Colleges and Universities. The university has developed a framework for curricular review and redesign. This presentation will focus on how UNLV utilized the curricular complexity tool developed by the University of New Mexico and the pass rate data to help inform that process. In addition we will share initial results from curricular redesign efforts with nine academic programs.

Shaping the Movement: Discussion on a Socially Just Design in the Curricular System

- Katie Locke, Director of Marketing and Communications and Ed Willis, Resident Fellow, Gardner Institute

Key Note Presenters

**Chaouki Abdallah**

Chaouki T. Abdallah, Ph.D. is the Executive Vice President for Research (EVPR) at Georgia Tech. Prior to that, he was a professor of Electrical and Computer Engineering (ECE) at the University of New Mexico (UNM). He also served as Chair of the ECE department and as Provost of UNM. He served as acting President, then interim President in June 2017, and finally the 22nd President, a position he held until February 2018 when he returned to his position as Provost until he assumed his current role at Georgia Tech. He is a Professor & Provost Emeritus at UNM. He has published eight books (three as co-editor and five as co-author) and more than 300 peer-reviewed paper. Abdallah obtained his Bachelor’s of Engineering (BE) degree from Youngstown State University and his MS and Ph.D. in Electrical Engineering from the Georgia Institute of Technology.

**Greg Heileman**

Gregory (Greg) L. Heileman currently serves as the Vice Provost for Undergraduate Education and Professor of Electrical and Computer Engineering at the University of Arizona, where he is responsible for facilitating collaboration across campus to strategically enhance quality and institutional capacity related to undergraduate programs academic administration. He has served in various administrative capacities in higher education since 2004. His experience includes work in the areas of faculty development, institutional research, accreditation and academic program review, curriculum management, student success, academic advisement, tutoring, student health & wellbeing, student conduct, budget and finance, economic development, policy development, information technology and data governance, and strategic planning. He earned the BA degree in Biology from Wake Forest University, the MS degree in Biomedical Engineering and Mathematics from the University of North Carolina-Chapel Hill, and the PhD degree in Computer Engineering from the University of Central Florida in 1989.
Katie Locke

Katie is an experienced marketer, communicator, and equity advocate. Driven by social justice and equity she takes pride in working towards achieving the institute's social justice mission. As the Director of Marketing and Communication, Katie leads the communications and marketing efforts for the Gardner Institute, she serves on the Excellence in Academic Advising Core team, and co-leads the Socially Just Design Project team for the Gardner Institute. She lives in Asheville, NC with her daughter Annabel.

Sara Stein Koch

Sara is an Institute Fellow and Senior Associate for Institutional Support with the Gardner Institute. She has spent the past three decades in administration, training, coaching, facilitation, and teaching in higher education. Her current work with the Institute involves the development of Excellence in Academic Advising. She also advises institutions in Excellence in Academic Advising, Foundations of Excellence First-Year and Transfer, Gateways to Completion, and Retention Performance Management processes. She also coordinates the curriculum for the Annual Gateway Course Experience Conference. Sara was involved in the development of the Gateways to Completion process, development and administration of the two year National Survey on Student Success practices, and strategic planning for the Institute.

Ed Willis

Ed Willis is a seasoned university administrator providing vision and leadership for diverse student-body environments, while managing key internal and external stakeholder relationships involving student affairs. He possesses a deep understanding of the academic process and its relationship to student issues, as well as the ability to identify and implement initiatives that promote student-centered communities, improve the quality of the student experience, and bolster university relations. As a leading expert on student-centered learning environments, Ed has held significant roles at major research universities, historically black colleges and universities, and large commuting/community colleges with student populations from 7K to 40K.

Case Studies Presenters

Kyna Betancourt

Dr. Kyna Betancourt, Assistant Dean in Undergraduate Studies, oversees the Enhanced General Education curriculum and assessment, UGS academic offerings, and the Curriculum Team responsible for maintaining the undergraduate curriculum at USF, producing the undergraduate catalog, and maintaining the course proposal system. She has had the pleasure of working with Dr. Greg Heileman to assist the College of Engineering in analyzing their curricula using CurricularAnalytics to reduce total credit hours for a majority of programs to 120 hours. She is also assisting on a grant to help students transfer successfully into the College of Engineering using CurricularAnalytics to analyze a combined curriculum.

Mitchell Colver

Dr. Mitchell Colver began working in higher education in 2007, where his early experiences with students taught him to focus on the value of human diversity and human potential. As a thought leader in the field of analytics, he is frequently invited to champion the idea that student success can best be fostered through increased intentionality. Dr. Colver believes that human empowerment and collaboration are the most powerful tools that 21st century institutions have in their arsenal to optimize the student ecosystem. His research has appeared in Popular Science, Discover, Slate, Smithsonian, New York Magazine, and, internationally, on Radio BBC.
Thank You to Georgia Tech and The University of Arizona - This Chapter's Co-Authors

Steven P. Dandaneau
Dr. Steven P. Dandaneau is Executive Director of the Reinvention Collaborative and Associate Provost at Colorado State University. In these roles, Dandaneau provides leadership for a national consortium of leading public and private research universities focused on innovation and excellence in undergraduate education and collaborates with colleagues to strengthen the undergraduate experience at Colorado State.

Brent Drake
Brent Drake, PhD serves as a Fellow for Research and Innovation. Dr. Drake is working on ongoing development of the Gardner Institute's EPC, assisting with the development of an Academic Advising improvement process, and ongoing analysis of the G2C projects. He also currently serves as the vice provost for the Office of Decision Support at the University of Nevada, Las Vegas (UNLV). He joined UNLV in 2017. As vice provost, Dr. Drake supports the university's leadership in its commitment to accountability and evidence-based decision-making through comprehensive data collection, integration analysis, research, and reporting.

Nathan Klingbeil
Nathan Klingbeil is a Professor of Mechanical Engineering at Wright State University in Dayton, OH, and served as Dean of the College of Engineering and Computer Science from 2013-2018. He is the lead investigator for Wright State’s National Model for Engineering Mathematics Education, which has been supported by over $5.0M in grants from the National Science Foundation. Dr. Klingbeil is widely regarded as a national expert in student retention and success in STEM, and has served as a content expert, invited speaker or workshop facilitator for a variety of higher education organizations, including AAC&U, Complete College America and Academic Impressions.

Laurel Pritchard
Laurel Pritchard is the Vice Provost for Undergraduate Education at the University of Nevada, Las Vegas (UNLV), where she oversees university student success and retention initiatives, the general education curriculum, and online education. Before assuming this role in 2016, she served as Assistant Director of Undergraduate Education and Assistant Professor of Psychology at UNLV. A first-generation college graduate, she earned a PhD in Neuroscience from the University of Cincinnati in 2004. In addition to her neuroscience research, she has published articles and given conference presentations on undergraduate neuroscience pedagogy, academic assessment, retention of underserved students, and

David E. Smith
Dr. David E. Smith, Associate Provost for Curriculum and Assessment, is responsible for overseeing curricular analytics projects at New Mexico State University (NMSU) including analysis of curricular complexity for improvement of degree programs and development of alternative STEM transfer pathways. He has extensive experience in STEM education, serving previously on the faculty of NMSU’s Chemistry and Biochemistry Department, and in faculty development as a Fellow of NMSU’s Teaching Academy. He currently serves as NMSU’s Institutional Liaison for the WICHE Interstate Passport and is a collaborator with WICHE on an NSF grant for development of a STEM Passport in Engineering.