The Peter Kiewit Institute

Student Capstone

&

Research Conference

in

Engineering and

Information Science & Technology

Conference Handbook
Welcome Conference Participants and Volunteers!

On behalf of the University of Nebraska, The Peter Kiewit Institute welcomes you to the fourth annual

Peter Kiewit Institute Student Capstone & Research Conference in Engineering, Information Science & Technology

The Peter Kiewit Institute in partnership with the University of Nebraska-Lincoln College of Engineering and the University of Nebraska-Omaha College of Information Science & Technology is proud to host a student focused conference which features presentations of research and projects from students based at PKI, and across the University of Nebraska system. The tracks align with the academic programs based at the Institute that are central to engineering, information science and technology as well as other research areas with emerging national significance. Assessment of student presentations at the conference will be made by independent, outside judges. The Institute welcomes attendance by faculty, students, industry partners and government representatives.

The Institute expresses its grateful appreciation to the judges, faculty, staff and students who volunteered their time to make this conference an outstanding event. PKI is also profoundly appreciative of industry companies and government agencies that generously sponsored the presentation tracks and special events of the conference. Without the support of these individuals, companies and organizations the conference would not be possible.

This handbook is designed to give all conference attendees and supporters with an overview of all events and responsibilities. Within this handbook are descriptions of student paper and project requirements and submissions, track leader duties and criteria for judging presentations.

A full understanding and appreciation of the conference’s purpose will help all those working in collaboration make the PKI Student Capstone & Research Conference a successful event. Thank you for joining us.

Sincerely,

Leah Ellis
Event Coordinator
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Capstone &amp; Research Conference</td>
<td>4</td>
</tr>
<tr>
<td>Tentative Event Schedule</td>
<td>5</td>
</tr>
<tr>
<td>Track Descriptions</td>
<td>6</td>
</tr>
<tr>
<td>Student Submissions</td>
<td>9</td>
</tr>
<tr>
<td>On-Line Abstract &amp; Report Submission</td>
<td>10</td>
</tr>
<tr>
<td>Track Leaders</td>
<td>10</td>
</tr>
<tr>
<td>Referees</td>
<td>10</td>
</tr>
<tr>
<td>Judges</td>
<td>11</td>
</tr>
<tr>
<td>Social &amp; Award Announcements</td>
<td>11</td>
</tr>
<tr>
<td>About The Peter Kiewit Institute</td>
<td>11</td>
</tr>
<tr>
<td>Appendix A: Referee Report Evaluation Form</td>
<td>12</td>
</tr>
<tr>
<td>Appendix B: Judges Presentation Evaluation Form</td>
<td>14</td>
</tr>
</tbody>
</table>
PKI Student Capstone & Research Conference

The Peter Kiewit Institute of the University of Nebraska, in partnership with the University of Nebraska-Lincoln College of Engineering and the University of Nebraska-Omaha College of Information Science & Technology is proud to host the Institute’s fourth annual Student Capstone & Research Conference in Engineering, Information Science and Technology on April 25, 2014. The Conference will feature papers and presentations by students from the University of Nebraska system. The Conference affords students with the opportunity to present their research and findings to a wide audience of fellow students, faculty, judges, and leaders from government and industry. For many students this will serve as the culminating event of their research and academic careers.

The conference is organized along presentation tracks which align with PKI academic programs and research clusters. Each track is assigned independent external judges who will identify the top three student presentations from among all who present. First, second, and third place student teams, and their academic institutions, will be recognized at the evening Capstone Banquet on April 25th.

If you are a faculty, student or student team interested in this exciting opportunity, we invite you to sign up. Please visit the following site, www.pki.nebraska.edu, and complete the online registration. Students must register and submit their abstracts by April 18, 2014 on this site.

The conference is open to all. If you are interested in attending the presentations in an area of interest to you, or to your academic unit, company or government agency, please visit the site. Attendees will also be able to register the day of the conference at PKI. If you have questions or want additional information, please contact Ms. Leah Ellis, event coordinator, at lellis@nebraska.edu or by telephone at 402.554.2158.
Tentative Event Schedule

Morning

8:00-10:00  Continental Breakfast
8:30-9:00  Administrative Meeting for Judges/Track leads
9:00-12:00  Presentation Tracks
12:00-1:00  Lunch

Afternoon

1:00-4:00  Presentation Tracks
4:00-4:30  Judges Break-out Session

Evening

4:00-5:30  Social & Award Announcements
5:30  Adjourn
Student Presentation Tracks & Descriptions

Track 1: Architectural Engineering
Track Leader: Dr. Dale Tiller
Architectural Engineers support the engineering component of the building design and construction process, designing building structures, heating ventilating and air conditioning (HVAC), acoustics, electrical and lighting systems. Architectural Engineers thus play a key role in the sustainable design and operation of buildings. In addition to the links between energy consumption and sustainability, we spend most of our time indoors, where the design choices made by Architectural Engineers charged with responsibilities for providing effective lighting, HVAC and acoustical environments will affect the acceptability of spaces and occupant productivity. This track highlights the role of Architectural Engineering in designing efficient and effective buildings.

Track 2: Computer & Electronics Engineering
Track Leader: Mr. Herb Detloff
The Computer Electronics Engineering track is focused on the applications of embedded microprocessor and communication systems. The design, development and integration of the hardware and software aspects of computer systems with communication networks has become an ever-expanding, pervasive influence on the modern world. The use of information technology has changed both the products and process of engineering. The solutions presented will include (but are not limited to) applications for: mobile computing, mobile communications, automobiles, appliances, entertainment, health care and aerospace.

Track 3: Civil Engineering
Track Leader: Dr. John Stansbury
The vision of this track is to have students positioned as global leaders who strive toward building a better quality of life. This track is an important opportunity for students in civil engineering fields to convene and focus on topics of the day. This year’s technical program focuses on “Bearing Knowledge for Sustainability”. It is important that civil engineering community integrate sustainability, in dealing with today’s issues whether they be technical, economic, social, environmental or political. This track also features our traditional sub-disciplines and technical sub-tracks such as environmental engineering, geotechnical engineering, structural engineering, transportation engineering, municipal or urban engineering, water resources engineering, materials engineering, coastal engineering, surveying, and construction engineering, international issues/projects, and state-of-the-art infrastructure projects. All research projects or papers related to these sub-disciplines and technical sub-tracks are welcome.

Track 4: Construction Engineering
Track Leader: Dr. Terri Norton
Construction engineering is an integrated discipline of engineering that draws upon the basic branches of civil, mechanical, and electrical engineering. In construction engineering, the structural and geotechnical portions of civil engineering combine with portions of mechanical and electrical engineering that relate to the constructed environment that encompasses buildings, bridges, highways, airports, dams, treatment plants, factories, and institutions. Additionally, construction engineering includes in its curriculum the skills of estimating and scheduling from industrial engineering along with accounting, organizational behavior, psychology, business methods, and business law from disciplines external to engineering. The construction engineer possesses the appropriate background in science and engineering to secure licensure
as a professional engineer, which meets the requirements placed on constructors working on projects in which the risks during construction often exceed those of a facility in its day to day service. Construction engineers are essential to all aspects of the constructed project life cycle: planning, design, construction, operation, maintenance, and decommissioning.

**Track 5: Construction Management**

Track Leader: Pat Cuddigan

This track focuses on innovative solutions in construction project management. This can include, but not be limited to, the development and use of project delivery systems, utilization of building information modeling, equipment simulation, more effective use of resources, and methods and materials for sustainable construction and design.

**Track 6: Informatics**

Track Leader: Dr. Abhishek Parakh

Informatics is the study of enabling people to analyze, synthesize, and produce information. Medical providers tracking disease trends, travelers searching for airline flights, engineers leveraging building infrastructure sensors to conserve energy, and analyst mining chat feeds to detect news events are examples of informatics in action. Growth in these user-guided knowledge discovery systems is accelerated by emerging technologies such as mobile devices, social media and cloud computing.

**Track 7: Computer Science**

Track Leader: Dr. Quiming Zhu

This track is to cover the broad areas of computer science. Topics are solicited from all subjects of computational theories, software engineering practices, and information system applications, including, but not limited to, automata theory, computability and complexity analysis, mathematical logic, number theory, concepts and principles in programming languages and compiler construction, data structures and algorithm design, computer architecture and operating systems, software engineering and modern software development methodologies, rewriting theory and machine translation, human-computer interaction and interfaces, database management systems and data warehouses, data mining, predictive modeling, numeric analysis and large systems of data processing, communication networks and information security, biomedical and human biology–inspired computing, artificial intelligence and knowledge intensive systems, multi-agents interactions and game theory, machine learning, computer graphics and game programming, graph theory and its applications, modeling and simulation, computational geometry, parallel processing and high-performance computing, cloud computing, cyber computing, fault-tolerant architectures and computing, pattern recognition and fuzzy logic systems, artificial neural networks, digital image processing and computer vision, hybrid dynamic systems and complex adaptive systems, stochastic processes and random optimization techniques. Secure information system management and large scale distributed systems, etc. Presentations can be an up-to-date coverage of contemporary and emerging concepts, models, techniques, and methodologies in computing and information systems, and other general and specific topics in computer science and engineering. Participants are encouraged to investigate the current state-of-art in one of the specific areas, to report the insights of the research topics, to present the results from particular research projects, and to identify the future research directions for an area of interest.
Track 8: Management Information Systems
Track Leader: Dr. Leah Pietron
This track focuses on the development and management of an organization’s information resources, technology, and infrastructure. As such, it brings together related disciplines to provide a framework for technology in the context of individual and organization decision making, problem solving, and business process support.

Track 9: Cyber Systems and Information Assurance
Track Leader: Dr. Robin Gandhi
Cyber systems have been integrated wide and deep into the infrastructure that supports our quality of life. The ability of these systems to preserve the security expectations of the users that rely on their services is now of utmost importance. Information Assurance (IA) is the practice of managing information-related risks. IA is concerned with the protection of confidentiality, integrity, and availability of data and their delivery systems in order to mitigate risk in the global IT infrastructure. Topics of interest in this track include, but not limited to: security engineering and principles, information operations, cryptography, vulnerability discovery, network & database security, digital forensics, software development & life cycle assurance, security appliances & products, security consultancy & services, regulatory requirements assessment, computer security management, disaster recovery, physical security, law, governance & ethics, security risk assessment for enterprise, project or product.

Track 10: IT Innovation
Track Leader: Doug Derrick
Information technology is ubiquitous. The challenge we face is to build effective systems that are both reliable and flexible, and to do so in a timely way. This track addresses that need through an in-depth practical experience. The focus is on a real-life information systems designed and developed by the students. The project will cover the project conceptualization, analysis & design of the system, prototyping, and user testing. Students are expected to bring knowledge from other courses and disciplines and their own experience into this track. Students are expected to apply their knowledge, to practice with different tools and techniques, to examine a variety of points of view, to critique the readings and others’ views, to stretch their thinking, and ultimately to learn and demonstrate what they have gleaned.

Track 11: Modeling and Simulation, Visualization and Analysis
Track Leader: Jim Taylor
This track focuses on cutting edge developments in modeling, simulation, visualization, and analysis technologies for understanding complex scientific, industrial, social, and information systems. Areas covered include, but are not limited to, models and algorithms, game-based planning and training, high performance computing technologies, visual analytics, and approaches for validation of simulations and models. Application disciplines include cyber security and information assurance, military and government, social networks, wireless telecommunications and policies, urban infrastructures and energy, bioinformatics, health informatics, and others. Students developing or using simulation tools are invited to participate and present original projects and papers.
Student Presentation Submissions

General. The Peter Kiewit Institute’s Student Capstone & Research Conference provides a forum for students to share their research in engineering, information science, technology and related fields and disciplines. Students are invited to present their findings to members of academe, industry and government. Students or student teams may submit more than one abstract or give more than one presentation but cannot submit the same abstract or give the same presentation to more than one track.

Students. Students who wish to be considered for the conference are required to submit an abstract not to exceed 250 words. Students may choose to submit an optional project report 4-6 pages in length. Students must be the primary authors of the paper and cannot be published, or currently submitted for publication.

Track Leaders will extend special invitations to presenters whose research complements the body of presentations in their respective tracks.


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<th>Event</th>
<th>Date</th>
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<tr>
<td>Open Call for Papers</td>
<td>1/31/2014</td>
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<td>Abstract Deadline</td>
<td>4/18/2014</td>
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<td>Registration Deadline</td>
<td>4/18/2014</td>
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<tr>
<td>Notification Deadline</td>
<td>4/21/2014</td>
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<tr>
<td>Project Report Deadline</td>
<td>4/22/2014</td>
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<tr>
<td>Conference &amp; Awards</td>
<td>4/25/2014</td>
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On-Line Abstract & Report Submission.

The following student information is required from all students submitting reports and giving a presentation.

<table>
<thead>
<tr>
<th>Title of Report or Presentation</th>
<th>Contact Information (cell &amp; email)</th>
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<tbody>
<tr>
<td>Intended Track</td>
<td>University/College</td>
</tr>
<tr>
<td>Student Name</td>
<td>Faculty Advisor</td>
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</table>

Track Leaders

Track leaders are key to a well run conference and are encouraged to enlist the assistance of faculty, staff and student volunteers in accomplishing the tasks outlined below.

Responsibilities:

- Solicit student participation
- Participate in capstone planning meetings
- Utilizing the online submittal site, receive and review abstracts and papers for suitability of presentation in a timely manner
- Assist Ms. Leah Ellis organize the presentation order to be presented in the track.
- Administer the track: watch time, sequence, and orderliness of the presentations the day of the event
- Assist judges as needed with the selection of first, second, and third place presentations.

Reviewers

Track leaders may solicit the assistance of Reviewers to critically evaluate the student reports. A Report Evaluation Form will be completed by each Reviewer. Each Reviewer is asked to consider the following in their critique of the report:

- Organization and Suitability
  - Is the material organized and focused?
  - Is the presentation and/or argument understandable?
  - Is this original research, a review of previous research, or informative?
  - Does the paper cover the topic comprehensively, partially, or as an overview?
  - Is the citation style clear and consistent?
- Illustrations: Are the use of charts, graphs, maps for relevant and aesthetically acceptable?
- Timeliness and Usefulness
  - Is the information current?
  - Does the research support or refute an argument?
  - Is the Bibliography selective with primary sources?
Track Judges:

Track Judges will participate in the conference by invitation. There will be two or more judges per track from sectors of the community such as academia, industry, and government. Judges must be able to commit the full day to hearing and observing the student presentations. Upon completion of all student presentations, the judges then decide first, second, and third place presentations. These selections should be based on content, student grasp of the information, student presentation of the information, and student’s ability to field the question and answer segment of their topic. A Presentation Evaluation Form will be completed by each Judge for each student presentation. The top three presentations in each track will be recognized at the evening banquet. Students will receive awards to commemorate the event.

Award of Excellence

Awards will be given to first, second and third place teams presenting in each track. First, second and third place awards will also be awarded for best project reports.

Announcement of Awards

The day’s events will close with a social hour and announcement of awards.

The Peter Kiewit Institute

The Peter Kiewit Institute is a University-level institute reporting through the Executive Vice President and Provost to the President of the University that resides on the University of Nebraska-Omaha campus. The institute is home to approximately 1900 undergraduate and graduate students and 110 faculty from two University of Nebraska colleges: College of Engineering (COE) at the University of Nebraska-Lincoln (UNL); and the College of Information Sciences and Technology (IS&T) at the University of Nebraska-Omaha (UNO). Other units operating out of the institute are the Holland Computing Center and the Peter Kiewit Institute Technology Development Corporation in addition to college-affiliated centers and schools such as the Charles W. Durham School of Architectural Engineering and Construction, Nebraska University Center for Information Assurance and the Institute for Collaboration Science among others.
2014 Student Capstone Conference
Report Evaluation Form – Referees

Information about the article:

<table>
<thead>
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<th>Student or Team Name</th>
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<tr>
<td>Title of Report</td>
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<td>Track</td>
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<tr>
<td>Unsatisfactory</td>
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<td>Needs Improvement</td>
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<tr>
<td>Satisfactory</td>
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<td>Developing Excellence</td>
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<tr>
<td>Excellent</td>
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Please consider the following in the critique of the report:

1) Organization and Suitability
   • Is the material organized, focused, and understandable?

   ____________________________________________________________
   ____________________________________________________________

   [1 2 3 4 5 N/A]

   • Is this original research, a review of previous research, or informative?

   ____________________________________________________________
   ____________________________________________________________

   [1 2 3 4 5 N/A]

   • If research is involved, does the paper contribute to the Body of Knowledge?

   ____________________________________________________________
   ____________________________________________________________

   [1 2 3 4 5]

   • Does the paper cover the topic comprehensively, partially, or as an overview?

   ____________________________________________________________
   ____________________________________________________________

   [1 2 3 4 5]
- Quality of Writing: Is the report well written with the citation style clear and consistent?

2) Illustrations
   - Are the charts, graphs, and maps relevant and aesthetically acceptable?

3) Timeliness and Usefulness
   - Is the information current; does it have a breadth of interest?

   - Does the research, if present, support or refute an argument?

   - Is the Bibliography selective with primary sources?

4) Evaluation

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<tr>
<td>Accept</td>
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<tr>
<td>Accept with modifications</td>
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<tr>
<td>Reject</td>
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N/A
# 2014 Student Capstone & Research Conference Presentation Evaluation Form – Judges

**Student**

**Department**

**Track**

**Presentation Title**

**Project type**  Select one: ____ Development  ____ Research

## Scale:

<table>
<thead>
<tr>
<th>Scale</th>
<th>1 Unsatisfactory</th>
<th>2 Needs Improvement</th>
<th>3 Satisfactory</th>
<th>4 Developing Excellence</th>
<th>5 Excellent</th>
</tr>
</thead>
</table>

## Criteria:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Development Project</th>
<th>Research Project</th>
<th>Score</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem and Motivation</td>
<td>Define the problem</td>
<td>Define the problem</td>
<td>1 2 3 4 5</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>State the motivation of the project</td>
<td>State the motivation of the research</td>
<td></td>
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<tr>
<td></td>
<td>Identify and discuss the development process</td>
<td>Identify and discuss the research methodology</td>
<td></td>
<td></td>
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<tr>
<td>Project Implementation</td>
<td>Describe project management</td>
<td>Identify the state of the art</td>
<td>1 2 3 4 5</td>
<td>20%</td>
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<tr>
<td></td>
<td>Identify solution design</td>
<td>Discuss research gaps and opportunities</td>
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<tr>
<td></td>
<td>Describe implemented artifacts</td>
<td></td>
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<tr>
<td>Testing and deployment</td>
<td>Identify a testing strategy</td>
<td>Assess results</td>
<td>1 2 3 4 5</td>
<td>20%</td>
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<td>Test artifacts produced</td>
<td>Discuss findings</td>
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<td></td>
<td>Discuss testing results and any deployment issues</td>
<td>Describe research contributions</td>
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<tr>
<td>Ability to answer questions</td>
<td>Answers presented logically</td>
<td></td>
<td>1 2 3 4 5</td>
<td>10%</td>
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<tr>
<td></td>
<td>Answers are accurate</td>
<td></td>
<td></td>
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<tr>
<td>Organization and Presentation</td>
<td>Well prepared, use professional terminology</td>
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<td>1 2 3 4 5</td>
<td>10%</td>
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<td></td>
<td>Direct eye contact, confident</td>
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<td></td>
<td>Projected voice and positive image</td>
<td></td>
<td></td>
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<td></td>
<td>Visual aids, prototypes are well prepared and utilized effectively</td>
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<tr>
<td></td>
<td>Presentation is summarized at the conclusion</td>
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**Total Score (between 5 and 25)**

The judges’ scores will determine the first, second, or third place.