Welcome to NC State

Graduate Program in Construction Engineering

Addressing today’s unparalleled challenges of the construction industry
Fitts-Woolard Hall: Faculty Offices (3rd floor)

Alex Albert
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Edward Jaselskis
#3229

Jessica Kaminsky
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Kevin Han
#3351

William Rasdorff
#3243

Roberto Nunez
#3211

Jim Rispoli
#3210

Doyun Lee
#1311
Classes

Access Campus Map: [https://maps.ncsu.edu/#](https://maps.ncsu.edu/#)
Academic Programs

• Many different paths to success
• Many different student needs

MS/MCE
- Develop a program that makes sense to YOU
- Research – develop expertise (guided)

PhD
- Develop and conduct research
- Build on MS/MCE – specialized expertise
Academic Programs: PhD

• Total ~ 3 to 4 years

• Masters + 18 to 24 hrs. typical (+2 to 3 semesters)
  - Course selection with support from advisor/committee

• Preliminary Exams
  - Written + Oral; early in 3rd semester
  - Develop feasible research plan
  - 4 to 5 person committee (one outside department rep)

• Final Defense
Academic Programs: MS/MCE

MS
• “Thesis” 3 – 6 hours of research
  - MS if funded - RA
  - Need advisor + 2 person committee
  - TA selected by faculty

MCE
• Only coursework in most cases
  - “3 Hour Project” if approved by faculty
Academic Programs: MCE Requirements

• *Minimum* 7 CON courses
• 1 course in CE (not from CON)
• 2 “Supporting” courses (see course choice list)
• Total 10 courses = 30 credit hours
• No more than 12 hours per semester!

A complete 30 hour Graduate Plan is due to the construction faculty prior to the end of your first semester.
Academic Programs: MS Requirements

• Same as MCE except:
  - Select courses that support research – recommended courses by advisor

• Minimum 7 CON courses
• 1 “Supporting” course (see course choice list)
• Total 8 courses = 24 credit hours
• Thesis = 6 credit hours
• No more than 12 hours per semester!

A complete 30 hour Graduate Plan is due to the construction faculty prior to the end of your first semester.
CON Courses

Fall 2023

• CE 592 Global Construction Practices (L&D) (Jaselskis)
• CE 592 Building Information Modeling in Construction (Lee)
• CE 567 Risk and Financial Management in Construction (L&D) (Nunez)
• CE 592 Construction Estimating, Planning & Control (Nunez)
• EGR 517 Facilities Engineering Systems (Rispoli)

Spring 2024

• CE 564 Legal Aspects (L&D) (Jaselskis)
• CE 763 Materials Management (L&D) (Rasdorf)
• EGR 590 Environmental Compliance for Facilities Engineers (L&D) (Rispoli)

(L) Live
(D) Distance Education Class

CE course offered by CON faculty
Supporting course offered by CON faculty
CON Courses

Fall 2024 (likely)
- CE 592 CII Best Practices (L&D) (Jaselskis)
- CE 592 Building Information Modeling in Construction (L) (Han)
- EGR 517 Facilities Engineering Systems (Rispoli)
- CE 538 Information Technology and Modeling (L&D) (Rasdorf)

Spring 2025 (likely)
- CE 561 Construction Project Management (L&D) (Jaselskis)
- CE 564 Legal Aspects of Contracting (L&D) (Jaselskis)
- CE 565 Construction Safety Management (L) (Albert)
- CE 763 Material Management (L&D) (Rasdorf)
- CE 567 Risk and Financial Management in Construction (L&D) (Nunez)
- EGR 590 Environmental Compliance for Facilities Engineers (L&D) (Rispoli)

(L) Live
(D) Distance Education Class

- CE course offered by CON faculty
- Supporting course offered by CON faculty
CE Courses

- CE 536 Numerical Methods
- CE 537 Computer Methods & Applications
- CE 538 Information Technology (Rasdorf)
- CE 592 Robotic Vision Systems (Han)
- CE 522 Pre-stressed Concrete Design
- CE 523 Steel Design
- CE 524 Masonry Design
- CE 528 Wood Design
- CE 548 Engineering Properties of Soils
- CE 549 Soil & Site Improvement
- CE 744 Foundation Engineering
- CE 503 Highway Design
- CE 504 Airport Design (for Navy and Air Force officers)
- CE 755 Pavement Design
Supporting Courses

• All CON Courses

• Specified CE Courses

• Other Courses
  o ISE 501 Operations Research
  o ISE 510 Applied Engineering Economy
  o ISE 562 Simulation Modeling
  o ST 515 Experimental Statistics for Engineers I
  o ST 516 Experimental Statistics for Engineers II
  o EGR 590-601 Environmental Compliance for Facilities Engineers (Spring) (Rispoli)
  o CE 675 Project (3 hour maximum)
# MCE Plan

Name: ___________________

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<thead>
<tr>
<th>Fall</th>
<th>Spring</th>
<th>Fall</th>
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<tbody>
<tr>
<td>CON 1</td>
<td>CON 6</td>
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<td>CON 2</td>
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<td>CON 3</td>
<td>CE</td>
<td>CON 3</td>
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<td>CON 4</td>
<td>Support 1</td>
<td>CON 4</td>
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<td>CON 5</td>
<td>Support 2</td>
<td>CON 5</td>
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Best Practices for Success

• Attend Classes and Complete Assignment on time
• Submit independent work for exams and quizzes
• Submit Assignments according to instructor instructions
• Avoid *Plagiarism*
  - Always cite source when ideas are adopted
  - Use quotation marks when text is adopted verbatim along with citation
  - Don’t resubmit term paper for another course for credit
• Make use of Professional Development Opportunities
  https://sites.google.com/ncsu.edu/ccee-professional-development/home

*Note: Plagiarism consequences are severe*
Best Practices for Success

Because plagiarism is an offense against core principles of academic integrity and a violation of NCSU's Code of Student Conduct, the consequences are severe.

So that you will be absolutely clear about the University's standards and expectations, as well as the consequences for failing to meet those standards. You may find below the Code of Student Conduct's Chapters 8 (Academic Integrity), 9 (Cheating), 10 (Plagiarism), and 13 (Sanctions for Academic Dishonesty).

Note that in all cases, regardless of the seriousness of the offense and the sort of supplemental penalty that might have been imposed, all violations are also punished with a student being placed on academic integrity probation for the remainder of his or her career at NCSU.
Job Placement

• Attend Career Fairs
• Attend Information Sessions

• Curricular Practical Training (CPT)
  • Do well in classes
  • Fewer classes in your last semester
  • Local jobsites/offices/remote
  • Summer (internship) or last semester
Construction Research
Integrated Information Models for production control

Jointly registered 4D Building Model and point clouds

- As-built Documentation
- Progress Monitoring
- Quality Control
- Safety Monitoring
- Contractor Hand-Over
GOAL
Development of automated mobile robotic welding system for off-site construction.

APPROACH
Advances in deep learning-based welding joint detection, vision-based automated robotic welding, and UGV integration.

IMPACT
Improve quality and efficiency of welding in nuclear construction site.

METHODS
Joint detection using deep-learning with visual sensors and robotic arm operation; Trajectory planning based on scanned data and performing welding; UGV integration for mobility.
Construction Safety

Hazard recognition performance: 33%

Hazard recognition performance: 67%
Construction Safety

Examples: Falling objects, fall and Trip hazards, collapsing roof, etc.
Construction Safety
Innovative Technologies

Concrete Pavement Profiler using Laser Scanning

Real time Asphalt Pavement Density using Microwaves

Robotic Sampling System

Project Success

• Modeling Project Success and failure
• Lessons Learned (NCDOT)
• Risk Assessment Programs (NCDOT)
• Evaluating Contingency Factors (NCDOT)
• Promoting CII Best Practices through promotional videos)
Increase visibility and use of Construction Industry Institute (CII) research

Develop a handbook that identifies CII Best Practices and tools for different Upstream, Midstream and Mining project characteristics

Increase use of CII tools by organizations with mature and less mature project management processes

Concept for Fit-for-Purpose Project Delivery Handbook

<table>
<thead>
<tr>
<th>CII Project Delivery Phases</th>
<th>Establish Business Case (if Needed)</th>
<th>Front End Planning</th>
<th>Detailed Scope</th>
<th>Detailed Design and Procurement</th>
<th>Construction</th>
<th>Commissioning and Startup</th>
<th>Turnaround</th>
<th>Operate Facility</th>
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<tbody>
<tr>
<td>GOAL</td>
<td>Gate 0: check readiness of project business case or need and determine if it’s ready to move forward for feasibility development</td>
<td>Gate 3: check project feasibility and determine if it’s ready to move forward to Concept development</td>
<td>Gate 4: evaluate project concept phases and determine if it’s appropriate to move forward to the Detailed Scope phase</td>
<td>Gate 5: check detailed plans of project and determine if projects are ready to move forward to execution (detailed design and construction)</td>
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<tr>
<td>APPROACH</td>
<td>Project Complexity and Importance Ratings used to determine project management requirements</td>
<td>Design: Effectiveness Toolkit (set of strategies)</td>
<td>Design for Materials Management</td>
<td>MOC</td>
<td>Preliminary Design and Engineering, Final Scope Definition: Prepare Cost and Schedule Control (Examine, PPA, IPM, PPA I50-150)</td>
<td>Recommended</td>
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Project Complexity and Importance Ratings used to determine project management requirements.
79% (!) of Global GHG Emissions come from Infrastructure

1. Use Less Energy & Materials
   (Improved Efficiencies, Different Tech, NOT Reduced Infrastructure Services)

2. Use Different Energy & Materials
   (Electrify, Switch to Green Electricity, Reduce Embodied Carbon)

3. Offset Unavoidable Emissions
   (Infrastructure is not a luxury)
Work Hard! Play Hard!

Have a wonderful semester!