Washington State University

MAJOR CURRICULAR CHANGE FORM - - COURSE

(Submit original signed form and ten copies to the Registrar's Office, zip 1035.)

Future Effective Date: 1/6/2013

☐ New course  ☐ Temporary course  ☐ Drop service course
(Effective date cannot be retroactive)

☐ There is a course fee associated with this course (see instructions)

☐ Variable credit

☐ Increase credit (former credit )

☐ Number (former number )

☐ Crosslisting (between WSU departments)
(Must have both departmental signatures)

☐ Conjoint listing (400/500)

☐ S, F grading

☐ Repeat credit (cumulative maximum ________ hours)

☐ Lecture-lab ratio (former ratio __________)

☐ Prefix (former prefix __________)

☐ Cooperative listing (UI prefix and number _________)

taught by: WSU ☐  UI ☐  jointly taught ☐

☐ Request to meet Writing in the Major [M] requirement (Must have All-University Writing Committee Approval)

☐ Request to meet GER in _________ (Must have GenEd Committee Approval)

☐ Professional course (Pharmacy & Vet Med only)

☐ Graduate credit (professional programs only)

☐ Other (please list request)

ENGR  421/521  Multidisciplinary Engineering Design II

ENGR course prefix  421/521  course no.

Senior or Graduate Standing

credit 1 4 3

lecture hrs per week

lab hrs per week

studio hrs per week

prerequisite

Description (20 words or less) We would like to include graduate students in this course since it has a major

research component.

Instructor: Karl Olsen/Cara Poor  Phone number: 3354547  Email: cpoor@wsu.edu

Contact: Phone number: 3350373  Email: kolsen@wsu.edu

Campus Zip Code: ______________________

- Please attach rationale for your request, a current and complete syllabus, and explain how this impacts other units in
Pullman and other branches (if applicable).

Secure all required signatures and provide 10 copies to the Registrar's Office.

Chair/Date  Dean/Date  General Education Com/Date

Chair (if crosslisted/interdisciplinary)*  Dean (if crosslisted/interdisciplinary) *  Graduate Studies Com/Date

All-University Writing Com/Date  Academic Affairs Com/Date  Senate/Date

*If the proposed change impacts or involves collaboration with other units, use the additional signature lines provided
for each impacted unit and college.
Description: Needs analysis and conceptualization of technological products and business plan for target market; multidisciplinary team development.

Rationale:

Increasingly, design projects involve teams composed of multiple disciplines working towards a common goal. Traditionally, engineers, architects, and other disciplines have difficulty communicating and working together that stems from a lack of knowledge of the others capabilities, role, and terminology. This course fills the need for improving interdisciplinary communication and cooperative work skill for solving real problems. Students are presented a client-based project provided by a city, state, or industrial entity. The interdisciplinary nature of the class attracts many design students across campus.

This course is currently listed as ENGR 420 (421) and employs context-based learning methods to teach design techniques, product development, and business plans. Students complete the portion of design that is within their discipline. The course is taught in 2 semesters; in ENGR 420 the students learn problem synthesis, data analysis, and the conceptual design process. In ENGR 421, the students learn the design process. We would like to make ENGR 420 (421) a 400/500 level class to include graduate students. There is a major research component in using cutting edge design techniques and product development. In the past 2 years, we have included graduate students in the course through the advanced topics listing. Many of these graduate students have gone on to do research on an aspect of the IDEX design project. The major difference between 420 (421) and 520 (521), as highlighted in the syllabus, is the additional requirement that graduate students lead discussions on at least 5 research papers that are related to the project. They will then develop a proposal for further research that will be presented to the class. Undergraduate students are expected to read the papers and ask the graduate students questions. As a result of this activity, the students become motivated to create innovative, unique designs to address the client’s needs. Research projects are also developed using the student proposals.

This course falls under the ENGR prefix because it is truly multidisciplinary; students from civil engineering, construction management, architecture, agriculture sciences, landscape architecture, and mechanical engineering take this course. The design disciplines (landscape architecture, architecture, and interior design) are losing the courses taught for their PhD programs. This class provides an enriched experience for those with less course options. There are few conjoint classes taught in engineering and architecture (i.e., of the 16 architecture graduate courses, none of them are conjoint, and only 9 of the 57 graduate courses taught in civil engineering are conjoint). This course is unique from the typical classes taught in each discipline due to the nature of the design projects and realistic experience gained from working with other disciplines as well as an actual client. Graduate and undergraduate students alike gain hands-on experience in design. A mix of undergraduate and graduate students is beneficial; undergraduate students concentrate on the basic design of the project and graduate students use current research to come up with innovative designs (that then need further testing). There are multiple benefits to making this course conjoint, and graduate students from all disciplines should be able to experience this class.
PROFESSORS

Karl Olsen  
E-mail: kolsen@wsu.edu  
Phone: (509) 335-0373  
Office: Sloan 127  
Office Hours: M-F 10:00 a.m. to 11:00 a.m.  
* Or by appointment

Cara Poor  
E-mail: cpoor@wsu.edu  
Phone: (509) 335-4547  
Office: Sloan 118  
Office Hours: M, W, Th 12:30-2  
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Michael Wolcott  
E-mail: wolcott@wsu.edu  
Phone: (509) 592-4757  
Office: Sloan 113  
Office Hours: By Appointment

Todd Beyreuther  
E-mail: beyreuther@wsu.edu  
Phone: (509) 335-5318  
Office: Carpenter 514  
Office Hours: MW By Appointment

PURPOSE OF COURSE

The WSU Integrated Design Experience (IDeX) is an interdisciplinary design studio that addresses funded, real-world projects at local and global scales with strong tenets of sustainability. This year’s studio partners with the City of Auburn to develop innovative stormwater strategies at multiple scales in the built environment. This semester is a continuation of the year-long contract with Auburn. In the fall, allied engineering and architecture courses proposed multiple conceptual urban and sustainable design strategies. This spring studio brings the disciplines directly together in a design studio format to work in integrated teams to create one large vision for the Auburn and to develop relevant strategies to a 20% construction document level. This level is defined as a proof of concept milestone that external professional firms could theoretically pick up the design ideas and further develop for actual bidding and construction.

Goals for this studio are to have every student exit with strong collaborative research, questioning, and design methods to utilize in their academic and professional work. The focus will be on developing open-source design thinking processes that foster innovation across multiple disciplines of research and practice.
## COURSE SCHEDULE

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TECHNOLOGY TUTORIALS: In collaboration with other architecture studios and faculty on the Pullman and Spokane campuses, students will have access to online tutorials to demonstrate applications that directly support the required modeling, analysis, and representation requirements over the semester. The tutorials and assigned tasks are required for ARCH 403 and ARCH 499 (pass/fail 1 credit elective section for non-architecture students) and optional for other IDEx students, but highly recommended to all students. The tutorials will be available online Fridays per the following schedule:

- **F 1.14 Online Tutorial 1:** Adobe Creative Suite (intro, blog entries)
- **F 1.21 Online Tutorial 2:** Autodesk Revit (workflow, view/sheet set-up)
- **F 1.28 Online Tutorial 3:** ArcGIS, Autodesk Vasari (conceptual building/site design and analysis)
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- **F 2.11 Online Tutorial 5:** Autodesk Robot (structural analysis), Autodesk Ecotect (energy, daylight analysis)
- **F 2.18 Online Tutorial 6:** Autodesk Inventor, Autodesk Revit (part/family modeling, import into Revit project file)
- **F 2.25 Online Tutorial 7:** Autodesk Revit (plan, elevation, section, detail views)
ASSESSMENTS
Student understanding of the material will be assessed with the following distribution:

- Schematic Design: 15%
- Design Development: 35%
- Construction Documents: 30%
- Participation: 15%
- Research Paper Discussions: 10%

SCHEMATIC DESIGN
15% of Final Grade

The review and document at the end of the fall semester completed an early schematic design phase (SD1). The design ideas now need to be edited, refined, and focused based on comments and evaluation by the client and the instructors. In addition, new ideas and contributions need to be incorporated by the incoming students.

Goals: conceptual idea transformation and clustering design team formation establish project program and scope

Evaluation: individual and group review by WSU faculty; grading by IDeX instructors

DESIGN DEVELOPMENT
35% of Final Grade

The Design Development phase will bring the conceptual and schematic design into construction drawings. Analysis, feasibility, coordination, and constructibility will be stressed in this phase for validation. Spatial and systemic coordination between the disciplines will occur during DD. Major design decisions and analysis should be determined at the end of this phase.

DD1 PHASE: (20%)
- Goals: site and building design and analysis systems design and analysis
- Evaluation: group digital & physical review by WSU faculty; grading by IDeX instructors

DD2 PHASE: (25%)
- Goals: detail & tectonic design and analysis parts and assemblies design and analysis
- Evaluation: group physical review by City of Auburn representatives; grading the IDeX instructors

CONSTRUCTION DOCUMENTS
30% of Final Grade

The final phase consists of drawing, specification, and model production. In addition, the presentation, marketing, and dissemination material (slides, videos, web content, scholarly papers) will be developed. Some refinement of details will occur, but no significant design changes should take place in this phase.

CD PHASE: (40%)
- Goals: documents, drawing, and model production; design dissemination
- Evaluation: group physical review by City of Auburn representatives/professionals; grading by IDeX instructors

Travel: The final presentation is mandatory and will occur in Auburn, WA on Friday, April 29. Transport to and from the presentation by charter bus will be arranged and covered by the course. The bus will likely leave Pullman in the afternoon on Thursday, April 28 and return to Pullman late in the evening of Friday, April 29. More details will be provided towards the end of the semester. Additional small group site visits and/or
presentations in Auburn might be necessary or beneficial throughout the semester. Please remain open and flexible to this possibility.

**PARTICIPATION**  
15% of Final Grade

Due to the nature of the IDeX studio the coursework is highly group oriented. In light of this fact each student will be graded upon their individual participation in the class. The professors as well as the group members will grade each of the students on their participation. This includes class attendance, participation in group discussions, and involvement in group projects.

**RESEARCH PAPER DISCUSSIONS**  
10% of Final Grade

To facilitate innovative, multidisciplinary design, students will participate in discussions on research papers related to the goals of the project that may affect the design. Current research in stormwater, hydrology, water quality, ecology, and related topics as applicable to specific disciplines will be investigated and discussed in groups. Students will be graded based on their participation in group discussions.

**EVALUATION**

Final grades will be assigned on the following standard scale based on total points earned in the course. Note that everyone in the course has the opportunity to earn an A. The instructor reserves the right to adjust the scale accordingly at the end of the semester to ensure that an appropriate allocation of grades is obtained, although grades will not be dropped lower. Final grades will be based on the following breakdown:

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**ACADEMIC INTEGRITY**

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F 2.25 Online Tutorial 7: Autodesk Revit (plan, elevation, section, detail views)
F 3.4 Online Tutorial 8: Autodesk Revit, Autodesk Inventor (3D views)
F 3.25 Online Tutorial 9: Autodesk Revit, Autodesk Inventor, Autodesk 3ds Max (lighting, rendering)
F 4.1 Online Tutorial 10: Adobe InDesign (print and interactive documentation)

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15% of Final Grade

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Goals: conceptual idea transformation and clustering design team formation establish project program and scope

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DESIGN DEVELOPMENT  
25% of Final Grade

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CONSTRUCTION DOCUMENTS  
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**RESEARCH PAPER DISCUSSIONS AND PROPOSAL**

**unique to the graduate level course**

To facilitate innovative, multidisciplinary design, students will search for and present at least 5 research papers related to the goals of the project that may affect the design. Current research in stormwater, hydrology, water quality, ecology, and related topics as applicable to specific disciplines will be investigated and discussed in groups. Graduate students will lead discussions on their chosen research papers and be evaluated by their peers (5%) as well as instructors (10%) based on:

1. Paper selection (applicability to project, discipline)
2. Presentation quality
3. Participation in other students’ discussions

Based on these and other research papers, graduate students will develop and present a proposal for further research and present to the class (10%). Further details on the structure and presentation of the proposal will be provided in a separate handout.

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F 2.25 Online Tutorial 7: Autodesk Revit (plan, elevation, section, detail views)
ASSESSMENTS
Student understanding of the material will be assessed with the following distribution:

- Schematic Design: 15%
- Design Development: 35%
- Construction Documents: 30%
- Participation: 15%
- Research Paper Discussions: 10%

SCHEMATIC DESIGN 15% of Final Grade

The review and document at the end of the fall semester concluded an early schematic design phase (SD1). The design ideas need to be edited, refined, and focused based on comments and evaluation by the client and the instructors. In addition, new ideas and contributions need to be incorporated by the incoming students.

Goals: conceptual idea transformation and clustering design team formation establish project program and scope
Evaluation: individual and group review by WSU faculty; grading by IDeX instructors

DESIGN DEVELOPMENT 35% of Final Grade

The Design Development phase will bring the conceptual and schematic design into construction drawings. Analysis, feasibility, coordination, and constructability will be stressed in this phase for validation. Spatial and systemic coordination between the disciplines will occur during DD. Major design decisions and analysis should be determined at the end of this phase.

DD1 PHASE: (20%)
- Goals: site and building design and analysis systems design and analysis
- Evaluation: group digital & physical review by WSU faculty; grading by IDeX instructors

DD2 PHASE: (25%)
- Goals: detail & tectonic design and analysis parts and assemblies design and analysis
- Evaluation: group physical review by City of Auburn representatives; grading the IDeX instructors

CONSTRUCTION DOCUMENTS 25% of Final Grade

The final phase consists of drawing, specification, and model production. In addition, the presentation, marketing, and dissemination material (slides, videos, web content, scholarly papers) will be developed. Some refinement of details will occur, but no significant design changes should take place in this phase.

CD PHASE: (40%)
- Goals: documents, drawing, and model production; design dissemination
- Evaluation: group physical review by City of Auburn representatives/professionals; grading by IDeX instructors

Travel: The final presentation is mandatory and will occur in Auburn, WA on Friday, April 29. Transport to and from the presentation by charter bus will be arranged and covered by the course. The bus will likely leave Pullman in the afternoon on Thursday, April 28 and return to Pullman late in the evening of Friday, April 29. More details will be provided towards the end of the semester. Additional small group site visits and/or
presentations in Auburn might be necessary or beneficial throughout the semester. Please remain open and flexible to this possibility.

**PARTICIPATION**

15 % of Final Grade

Due to the nature of the IDEX studio the coursework is highly group oriented. In light of this fact each student will be graded upon their individual participation in the class. The professors as well as the group members will grade each of the students on their participation. This includes class attendance, participation in group discussions, and involvement in group projects.

**RESEARCH PAPER DISCUSSIONS**

10% of Final Grade

To facilitate innovative, multidisciplinary design, students will participate in discussions on research papers related to the goals of the project that may affect the design. Current research in stormwater, hydrology, water quality, ecology, and related topics as applicable to specific disciplines will be investigated and discussed in groups. Students will be graded based on their participation in group discussions.

**EVALUATION**

Final grades will be assigned on the following standard scale based on total points earned in the course. Note that everyone in the course has the opportunity to earn an A. The instructor reserves the right to adjust the scale accordingly at the end of the semester to ensure that an appropriate allocation of grades is obtained, although grades will not be dropped lower. Final grades will be based on the following breakdown:

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**ACADEMIC INTEGRITY**

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PROFESSORS

Karl Olsen
E-mail: kolsen@wsu.edu
Phone: (509) 335-0373
Office: Sloan 127
Office Hours: M-F 10:00 a.m. to 11:00 a.m.
* Or by appointment

Cara Poor
E-mail: epool@wsu.edu
Phone: (509) 335-4547
Office: Sloan 118
Office Hours: M, W, Th 12:30-2
* Or by appointment

Michael Wolcott
E-mail: wolgott@wsu.edu
Phone: (509) 592-4757
Office: Sloan 113
Office Hours: By Appointment

Todd Beyreuther
E-mail: beyreuther@wsu.edu
Phone: (509) 335-5318
Office: Carpenter 514
Office Hours: MW By Appointment

PURPOSE OF COURSE
The WSU Integrated Design Experience (IDeX) is an interdisciplinary design studio that addresses funded, real-world projects at local and global scales with strong tenets of sustainability. This year’s studio partners with the City of Auburn to develop innovative stormwater strategies at multiple scales in the built environment. This semester is a continuation of the year-long contract with Auburn. In the fall, allied engineering and architecture courses proposed multiple conceptual urban and sustainable design strategies. This spring studio brings the disciplines directly together in a design studio format to work in integrated teams to create one large vision for the Auburn and to develop relevant strategies to a 20% construction document level. This level is defined as a proof of concept milestone that external professional firms could theoretically pick up the design ideas and further develop for actual bidding and construction.

Goals for this studio are to have every student exit with strong collaborative research, questioning, and design methods to utilize in their academic and professional work. The focus will be on developing open-source design thinking processes that foster innovation across multiple disciplines of research and practice.
### Course Schedule

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<thead>
<tr>
<th>WEEK 1</th>
<th>MONDAY</th>
<th>WEDNESDAY</th>
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<tbody>
<tr>
<td>1</td>
<td>Project Intro and Fall Recap</td>
<td>Schematic Design Review</td>
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<td>2</td>
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<td>Schematic Design Development</td>
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<tr>
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F 2.25 Online Tutorial 7: Autodesk Revit (plan, elevation, section, detail views)
F 3.4 Online Tutorial 8: Autodesk Revit, Autodesk Inventor (3D views)
F 3.25 Online Tutorial 9: Autodesk Revit, Autodesk Inventor, Autodesk 3ds Max (lighting, rendering)
F 4.1 Online Tutorial 10: Adobe InDesign (print and interactive documentation)

**ASSESSMENTS**

Student understanding of the material will be assessed with the following distribution:

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**SCHEMATIC DESIGN**

15% of Final Grade

The review and document at the end of the fall semester completed an early schematic design phase (SD1). The design ideas now need to be edited, refined, and focused based on comments and evaluation by the client and the instructors. In addition, new ideas and contributions need to be incorporated by the incoming students.

Goals: conceptual idea transformation and clustering design team formation establish project program and scope

Evaluation: individual and group review by WSU faculty; grading by IDeX instructors

**DESIGN DEVELOPMENT**

25% of Final Grade

The Design Development phase will bring the conceptual and schematic design into construction drawings. Analysis, feasibility, coordination, and constructibility will be stressed in this phase for validation. Spatial and systemic coordination between the disciplines will occur during DD. Major design decisions and analysis should be determined at the end of this phase.

DD1 PHASE: (20%)
- Goals: site and building design and analysis systems design and analysis
- Evaluation: group digital & physical review by WSU faculty; grading by IDeX instructors

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- Goals: detail & tectonic design and analysis parts and assemblies design and analysis
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**CONSTRUCTION DOCUMENTS**

25% of Final Grade

The final phase consists of drawing, specification, and model production. In addition, the presentation, marketing, and dissemination material (slides, videos, web content, scholarly papers) will be developed. Some refinement of details will occur, but no significant design changes should take place in this phase.

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Due to the nature of the IDex studio the coursework is highly group oriented. In light of this fact each student will be graded upon their individual participation in the class. The professors as well as the group members will grade each of the students on their participation. This includes class attendance, participation in group discussions, and involvement in group projects.

**RESEARCH PAPER DISCUSSIONS AND PROPOSAL**

**unique to the graduate level course**

To facilitate innovative, multidisciplinary design, students will search for and present at least 5 research papers related to the goals of the project that may affect the design. Current research in stormwater, hydrology, water quality, ecology, and related topics as applicable to specific disciplines will be investigated and discussed in groups. Graduate students will lead discussions on their chosen research papers and be evaluated by their peers (5%) as well as instructors (10%) based on:
1. Paper selection (applicability to project, discipline)
2. Presentation quality
3. Participation in other students’ discussions

Based on these and other research papers, graduate students will develop and present a proposal for further research and present to the class (10%). Further details on the structure and presentation of the proposal will be provided in a separate handout.

**EVALUATION**

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