

**iCons 2 Renewable Energy (i2e) [NatSci 289H (sec 2)] – Spring 2014 Syllabus**  
 (version 2, 3/9/2014)



**i2e Instructional Team:**

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Sarah Wilson, Chemical Engineering ([swilson@ecs.umass.edu](mailto:swilson@ecs.umass.edu))

**i2e Spacetime:** TBL Classroom, Goodell 608, Tues/Thur, 11:15am – 12:30pm

**i2e Overall Course Structure:**

Component	# of Weeks
Communication Bootcamp	6
Mid-Term Proposals	1
Extended Case Study Project	6

**i2e Overall Objective:** Win a Sustainability Innovation & Engagement Grant (up to \$12,500)  
 (<http://www.umass.edu/sustainability/get-involved/sustainability-innovation-engagement-fund>)

**i2e Learning Goals: Each student learns to ... in the context of Renewable Energy problems.**

1. ... write effectively and clearly, *individually and as a team*,\* ... Goal #1 (required)

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2. ... speak effectively and clearly ...
3. ... create clear and effective visual presentations ... Goal Area #2
4. ... communicate with scientists and non-scientists ...
5. ... engage in vigorous *and effective*\* scientific dialogue ...

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6. ... synthesize economical, environmental, and social concerns with technical arguments ...
7. ... work collaboratively and synergistically in teams ...
8. ... exert leadership of their own investigations ... Goal Area #3
9. ... offer and utilize constructive criticism ...
10. ... apply creativity in problem-solving ...

\*Italicized portions added by i2e students, Jan 22, 2013.

**i2e Communication Products:**

- Communication Bootcamp (all individual communication products):
  - Personal Statement / Resume ..... week 1
  - Abstract ..... week 2
  - PPT slide/speech ..... week 3
  - Research Paper ..... weeks 4-5
  - Revision / Reflection ..... week 6
- Mid-Term Proposal Panel: ..... week 7
  - All: <1pg Proposal with Figure
  - Some: 1 PPT Slide and Talk
- Extended Team Case-Study Project:
  - Position Paper ..... week 8-11
  - Debate
    - Internal Debate (5 teams, 3 winners)...week 12
    - External Debate (like last year).....week 14 (Finals week)
  - Poster if no External Debate.....week 14 (Finals week)
- Individual Reflection on i2e.....week 13

**i2e Grading:** Student progress and excellence monitored for (at least) three goals: Goal #1 and one additional goal each from Goal Areas #2 and #3, as chosen in students' initial Personal Statements.

**Tentative Schedule (subject to change, students will be apprised asap)****Week 1: Personal Statement (Reverse Design Obj's / Frame i2e with Sus. Innov. & Engage. Fund)**

- Tues Jan 21: Frame i2e w/ Career/iCons/i2e objectives, SIEF (*Bridget Macdonald*)
- Thur Jan 23: Elements personal statement & resume, Begin work (*Bridget Macdonald*)

**Week 2: Abstract (Read one article on either Wind, Solar, Fracking, or Carbon Capture for 1/28)**

- Tues Jan 28: Discuss article in team, core meanings; Elements of good abstracts
- Thur Jan 30: Abstract first drafts due, Peer assessment of abstracts (Abstract tips)

**Week 3: Powerpoint or Prezi Slide (stick with same article)**

- Tues Feb 4: Examples of slides/talks (good and bad); plan format and begin (complete after class)
- Thur Feb 6: Slides/talks due, Peer assessment of slides (*Bridget Macdonald*)

**Week 4: Individual Research Report (IRR) (student-chosen topics)**

- Tues Feb 11: *Field Trip*: UMass Central Heating Plant (aka, Combined Heat and Power = CHP)
- Thur Feb 13: NO CLASS; Snow Day

**Week 5: Individual Research Report (continue)**

- Tues Feb 18: NO CLASS; UMASS "MONDAY"
- Thur Feb 20: (Bmac MC) 1<sup>st</sup> Draft IRR due, SIEF (*Ezra Small*) SIEF, Research (*Paulina Borrego*)

**Week 6: Revision / Reflection**

- Tues Feb 25: 2<sup>nd</sup> Draft IRR due, Discuss constructive criticism/next revision, Carbon thermochem
- Thur Feb 27: New revision due, Exs of proposals, Structure of good proposals (*Sarah Wilson*)

**Week 7: Midterm Proposal Panel**

- Tues Mar 4: MAP, Panel (*DV*)
- Thur Mar 6: Top 11 talks, Discuss debate Q (*Sarah Wilson*)

**Week 8: Position Paper Begins**

- Tues Mar 11: New teams, Discuss Debate Q, Research BCAT Explainer (*Paulina Borrego*)
- Thur Mar 13: BCAT Explainer 1<sup>st</sup> draft due, Big Pic: BCAT/PFT Exp/Pro/Cons, 4 Es (*Bmac*)

**Week 9: Position Paper Continues**

- Tues Mar 25: BCAT Explainers: 2<sup>nd</sup> draft writeups due, 10 min chalk-talks due (*Ben Weil*)
- Thur Mar 27: Service Learning (*John Reiff*), Research on BCAT Pros-Cons

**Week 10: Position Paper Continues**

- Tues Apr 1: BCAT Pros/Cons – 500 words (2 per team) and one 10 min chalk-talk due
- Thur Apr 3: Research on PFT Explainer

**Week 11: Position Paper Continues**

- Tues Apr 8: PFT Explainers – 500 words (2 per team) and one 10 min chalk-talk due
- Thur Apr 10: Research on PFT Pro/Con study

**Week 12: Position Paper / Debate Prep**

- Tues Apr 15: PFT Pros/Cons – 500 words (2 per team) and one 10 min chalk-talk due
- Thur Apr 17: Debate prep

**Week 13: Internal Debate**

- Tues Apr 22: Internal debates
- Thur Apr 24: Teamwork on final projects

**Week 14: External Debate**

- Tues Apr 29: Individual course reflection

**Appendix I: Inventory of Inception/Reference Materials:****“Topic” Inception Materials (many from C&E News for consistency in format)**

- **Plastic Solar Cells (featuring DV!)**
  - <http://cen.acs.org/articles/88/i34/Power-Plastic.html>
- **Nuclear Energy**
  - <http://cen.acs.org/articles/88/i37/Nuclear-Efficiency.html>
- **Coal Energy**
  - <http://cen.acs.org/articles/90/i47/Lurching-Toward-Low-Pollution-Coal.html>
- **Natural Gas via Hydraulic Fracturing (aka Fracking)**
  - <http://cen.acs.org/articles/90/i42/Treating-Water-Hydraulic-Fracturing.html>

**Scientific (and other) Topics With Which Students Will Likely Come In Contact**

- Converting among various Energy Units
- Kinds of Work (mechanical, gravitational, electrical, chemical, ...)
- Typical Energy Magnitudes for Different Sources
- Energy Conversion Efficiencies
- Environmental Impacts of Energy Conversion, Storage, and Utilization (pollution, climate change)
- Economics of Energy Conversion, Storage, and Utilization
- Social Impacts of Energy Conversion, Storage, and Utilization

**“Communication Product” Inception Materials**

- Example of Abstract/Article: SMA JACS
- Example of Figure: DV JPC
- Example of Slide: iCons Assessment slide
- Example of Proposal: i3e proposal
- Example of Op-Ed: David Brooks NY Times
- Example of Letter-to-Editor: SMA NY Times
- Example of Letter-to-Policy: Einstein to FDR

**Reference Materials / Resources**

- McKinsey Nov 2011 Report on “Resource Revolution”
- Energy Information Association (2010, 2012) “Annual Energy Review”
- UMass Amherst Physical Plant “Sustainability Initiative” (Ezra Small, Craig Nicholson)
- Energy Flow Diagrams

**Typical Reflection Questions**

- What were the biggest challenges in completing the assignment?
- How well did your group work as a \*team\*?
- Did you yourself learn what you expected to?
- Did you reach your expectations?
- Based on the feedback, if you were given an opportunity to do assignment again, what would you do differently? (learning from “mistakes”)
- What communication “best practices” emerged?

**Appendix II: Student Contract** (Retain this copy for your records)

Please initial before each statement, acknowledging that (i) you have carefully read the syllabus, and (ii) you understand your responsibilities in this course and the way your work will be evaluated. Please sign the bottom of the sheet and return it during the next class meeting. We will not record any grades for you until we have your initialed/signed contract.

\_\_\_\_\_ I have carefully read and understood this entire syllabus.

\_\_\_\_\_ I will adhere to the highest standards of academic honesty.

\_\_\_\_\_ I will attend every class unless I am ill or have extraordinary circumstances.

\_\_\_\_\_ I understand how my performance will be evaluated, and how my grade will be earned.

\_\_\_\_\_ I know that help is available to me outside of class through (1) instructor office hours, (2) other experts at UMass Amherst and beyond, and I will seek that help if I determine such help is necessary.

Name: \_\_\_\_\_ Student ID Number: \_\_\_\_\_

Signature: \_\_\_\_\_

**Appendix III: Student Contract** (Detach and submit this copy for my records)

Please initial before each statement, acknowledging that (i) you have carefully read the syllabus, and (ii) you understand your responsibilities in this course and the way your work will be evaluated. Please sign the bottom of the sheet and return it during the next class meeting. We will not record any grades for you until we have your initialed/signed contract.

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