ARIZONA STATE UNIVERSITY

GENERAL STUDIES COURSE PROPOSAL COVER FORM

Course information:

*Copy and paste **current** course information from Class Search/Course Catalog.*

Academic Unit: **Ira A Fulton Schools of Engineering**

Department: **School for Engineering of Matter, Transport & Energy/Chemical Engineering**

Subject: **CHE** Number: **462** Title: Process Design Units: 3

Is this a cross-listed course? No
If yes, please identify course(s)

Is this a shared course? No If so, list all academic units offering this course
Course description:

Requested designation: (Choose One)
*Note- a **separate** proposal is required for each designation requested*

Eligibility:

Permanent numbered courses must have completed the university's review and approval process.
For the rules governing approval of omnibus courses, contact Phyllis.Lucie@asu.edu or Lauren.Leo@asu.edu.

Submission deadlines dates are as follow:

For Fall 2015 Effective Date: October 9, 2014 For Spring 2016 Effective Date: March 19, 2015

Area(s) proposed course will serve:

A single course may be proposed for more than one core or awareness area. A course may satisfy a core area requirement and more than one awareness area requirements concurrently, but may not satisfy requirements in two core areas simultaneously, even if approved for those areas. With departmental consent, an approved General Studies course may be counted toward both the General Studies requirement and the major program of study.

Checklists for general studies designations:

Complete and attach the appropriate checklist

- Literacy and Critical Inquiry core courses (L)
- Mathematics core courses (MA)
- Computer/statistics/quantitative applications core courses (CS)
- Humanities, Arts and Design core courses (HU)
- Social-Behavioral Sciences core courses (SB)
- Natural Sciences core courses (SQ/SG)
- Cultural Diversity in the United States courses (C)
- Global Awareness courses (G)
- Historical Awareness courses (H)

A complete proposal should include:

- ☒ Signed General Studies Program Course Proposal Cover Form
- ☒ Criteria Checklist for the area
- ☒ Course Catalog description
- ☒ Course Syllabus
- ☒ Copy of Table of Contents from the textbook and list of required readings/books

Respectfully request that proposals are submitted electronically with all files compiled into one PDF. If necessary, a hard copy of the proposal will be accepted.

Contact information:

Name: Mia Kroeger Phone: x7-9318

Mail code: 6106 E-mail: mia.kroeger@asu.edu

Department Chair/Director approval: *(Required)*

Chair/Director name (Typed): Lenore Dai Date: 1/21/15

Chair/Director (Signature): [signature]

Arizona State University Criteria Checklist for

LITERACY AND CRITICAL INQUIRY - [L]

Rationale and Objectives

Literacy is here defined broadly as communicative competence—that is, competence in written and oral discourse. **Critical inquiry** involves the gathering, interpretation, and evaluation of evidence. Any field of university study may require unique critical skills that have little to do with language in the usual sense (words), but the analysis of written and spoken evidence pervades university study and everyday life. Thus, the General Studies requirements assume that all undergraduates should develop the ability to reason critically and communicate using the medium of language.

The requirement in Literacy and Critical Inquiry presumes, first, that training in literacy and critical inquiry must be sustained beyond traditional First Year English in order to create a habitual skill in every student; and, second, that the skill levels become more advanced, as well as more secure, as the student learns challenging subject matter. Thus, two courses beyond First Year English are required in order for students to meet the Literacy and Critical Inquiry requirement.

Most lower-level [L] courses are devoted primarily to the further development of critical skills in reading, writing, listening, speaking, or analysis of discourse. Upper-division [L] courses generally are courses in a particular discipline into which writing and critical thinking have been fully integrated as means of learning the content and, in most cases, demonstrating that it has been learned.
Notes:

1. ENG 101, 107 or ENG 105 must be prerequisites
2. Honors theses, XXX 493 meet [L] requirements
3. The list of criteria that must be satisfied for designation as a Literacy and Critical Inquiry [L] course is presented on the following page. This list will help you determine whether the current version of your course meets all of these requirements. If you decide to apply, please attach a current syllabus, or handouts, or other documentation that will provide sufficient information for the General Studies Council to make an informed decision regarding the status of your proposal.

Revised April 2014

Proposer: Please complete the following section and attach appropriate documentation.

ASU - [L] CRITERIA

TO QUALIFY FOR **[L]** DESIGNATION, THE COURSE DESIGN MUST PLACE A MAJOR EMPHASIS ON COMPLETING CRITICAL DISCOURSE--**AS EVIDENCED BY THE FOLLOWING CRITERIA:**

YES	NO		Identify Documentation Submitted
☒	☐	**CRITERION 1:** At least 50 percent of the grade in the course should depend upon writing assignments (see Criterion 3). Group projects are acceptable only if each student gathers, interprets, and evaluates evidence, and prepares a summary report. *In-class essay exams may not be used for [L] designation.*	Yes

1. Please describe the assignments that are considered in the computation of course grades--and indicate the proportion of the final grade that is determined by each assignment.
2. **Also:**

Please **circle, underline, or otherwise mark** the information presented in the most recent course syllabus (or other material you have submitted) that verifies **this description** of the grading process--and label this information **"C-1"**.

C-1

YES	NO		Identify Documentation Submitted
☒	☐	**CRITERION 2:** The writing assignments should involve gathering, interpreting, and evaluating evidence. They should reflect critical inquiry, extending beyond opinion and/or reflection.	Yes

1. Please describe the way(s) in which this criterion is addressed in the course design.
2. **Also:**

Please **circle, underline,** or **otherwise mark** the information presented in the most recent course syllabus (or other material you have submitted) that verifies **this description** of the grading process--and label this information **"C-2"**.

C-2

YES	NO		Identify Documentation Submitted
☒	☐	**CRITERION 3:** The syllabus should include a minimum of two writing and/or speaking assignments that are substantial in depth, quality, and quantity. Substantial writing assignments entail sustained in-depth engagement with the material. Examples include research papers, reports, articles, essays, or speeches that reflect critical inquiry and evaluation. Assignments such as brief reaction papers, opinion pieces, reflections, discussion posts, and impromptu presentations are not considered substantial writing/speaking assignments.	Yes

1. Please provide relatively detailed descriptions of two or more substantial writing or speaking tasks that are included in the course requirements
2. **Also:**

Please **circle, underline,** or **otherwise mark** the information presented in the most recent course syllabus (or other material you have submitted) that verifies **this description** of the grading process--and label this information **"C-3"**.

C-3

ASU - [L] CRITERIA			
YES	**NO**		**Identify Documentation Submitted**
☒	☐	**CRITERION 4:** These substantial writing or speaking assignments should be arranged so that the students will get timely feedback from the instructor on each assignment in time to help them do better on subsequent assignments. *Intervention at earlier stages in the writing process is especially welcomed.*	Yes

1. Please describe the sequence of course assignments--and the nature of the feedback the current (or most recent) course instructor provides to help students do better on subsequent assignments

2. **Also:**

Please **circle, underline,** or **otherwise mark** the information presented in the most recent course syllabus (or other material you have submitted) that verifies **this description** of the grading process--and label this information **"C-4".**

C-4

Course Prefix	Number	Title	General Studies Designation
ChE	462	Process Design	L

Explain in detail which student activities correspond to the specific designation criteria. Please use the following organizer to explain how the criteria are being met.

Criteria (from checksheet)	How course meets spirit (contextualize specific examples in next column)	Please provide detailed evidence of how course meets criteria (i.e., where in syllabus)
Criterion 1	The writing assignments (Project Reports 1 and 2 are counted 70% towards the final course grade). Project 1 is an individual effort & report. Project 2 is a team effort but each student "gathers, interprets, and evaluates evidence" and prepares and submit an indiviudal report; moreover, Project 2 assignment specifically notes "that there will be some grading as a team but you will be mainly graded individually on your section of (contribution to) the report."	Please see the circled C-1 items on the last page of the attached course syllabus of 2013 and 2014, respectively. Also, please see the circiled statements as C-1 in the actual project assignments of 2013 and 2014, respectively.
Criterion 2	The nature of the projects for the writing assignments are technical such as "Design for Produced Water Reclamation" (Project 1, 2013), "Design for Carbon Dioxice-Free Utilities" (Project 2, 2014), " Design for Reduced Semi-Tractor Trailer Vehicle Emission" (Project 1, 2014), and "Design for Water, Electricity and Environmenta Concerns (Project 2, 2014). These projects requires stduents developing critical thinking skills and "gathering, intepreting, and evaluaing evidences" and reflect "critical inquiry."	The original writing assignments of 2013 and 2014 are attached as whole as C-2.
Criterion 3	The course inclues assignments of two in-depth project written reports and one oral presentation	Please see the circled C-3 items on the last page of the attached course syllabus of 2013 and 2014, respectively. The original writing assignments of 2013 and 20144 are attached as C-3.

Criterion 4	The writing assignments starts with a designated lecture on "Report Writing Chapter 11)". In addition, there is a requirement to submit a "Project Progress Report" so the students can receive some feedback. Also, a report grading sheet is provided before each project report is due. There are required team meetings with the instructor before the second report and oral presentation. The course also includes a designated lecture on "how to give an oral presentation CH 11" before the oral presentaiton. An oral presentation grading sheet is provided to the students prior to the presentation itself. Finally, it is important to note that "the first report is graded by ME and returned to the class within a week - well ahead of the second report due date" (direct quote from the instructor).	Please see the circled C-4 items in the course syllabus of 2013 and 2014, respectively. Also, the report grading sheets are attached and labeled as C-4. Please see the circiled statements as C-4 in the actual project assignments of 2013 and 2014, respectively. Please see see the grading sheet of 2013 and 2014 labeled as C-4. Please also see an email communication (labeled as C-4) between Dr. Lenore Dai, the Program Chair of Chemical Engineering and the Dr. James Beckman, the instructor of ChE 462. dated 1/8-1/9 2015.

Course Catalog Description

Course	Title	Units	GeneralStudies
CHE 462	**Process Design** Applies economic principles to optimize equipment selection and design; development and design of process systems. **Allow multiple enrollments:** No **Repeatable for credit:** No **Primary course component:** Lecture **Grading method:** Student Option **Offered by:** Ira A. Fulton Schools of Engineering -- Chemical Engineering Program Pre-requisites: Engineering BS or BSE student; CHE 432, CHE 442 and CHE 433 with C or better OR Graduate Engineering student		

ARIZONA STATE UNIVERSITY
CHEMICAL ENGINEERING PROGRAM
SENIOR PROCESS DESIGN
CHE 462
Tentative Syllabus
Spring 2014

Professor Beckman (J.R.BOSS) — SCOB 150
ERC 291/SCOB 194 — M,W,F
9:00 – 9:50 AM
965-4395 — Office Hours 10:00 – 11:00AM M,W,F

CHE 462: Process Design. 3 credits. Application of economic principles to optimize equipment selection, sizing and cost(design) of process systems. Prereq. CHE 432, CHE 433, CHE442 and everything else except lab courses and control!

FORMAT: I'm your first boss and this is your first job. You will be a design engineer in a company that is contracted by a client needing design assistance.

Think of alternatives

On the job environment

Involving group interaction

TEXTBOOK: Peters, Timmerhaus, and West, *Plant Design and Economics for Chemical Engineers, 5th* Edition, McGraw-Hill, 2003

REFERENCES:

McCabe, Smith and Harriott, *Unit Operations of Chemical Engineering,* McGraw-Hill, 2001

Woods, Don *Process Design and Engineering Practice with Data for Process Design and Engineering Practice,* Prentice-Hall, 1995.

Rudd, Dale and Charles Watson, *Strategy of Process Engineering,* John Wiley, 1968.

Geankoplis, John, *Transport Processes and Separation Process Principles,* Prentice Hall, 2003.

Perry, ed, *Chemical Engineers Handbook,* all editions.

Seider, Seader and Lewin, *Product & Process Design Principles,* John Wiley, 2004.

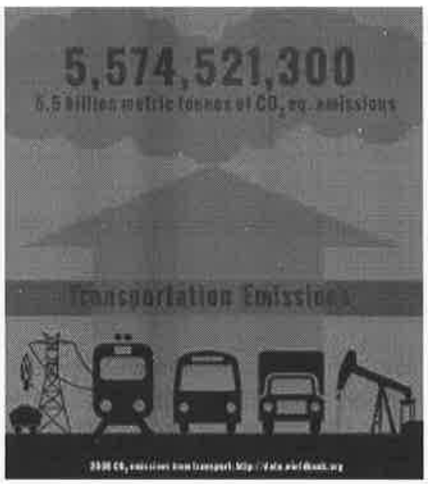
TOPICS BY WEEK:

Week of **Topics**

Jan 13 M; Introduction to Design, Generation of Alternatives (The Physics Exam) CH 1
W; process alternatives – example : ammonia production
Soft F: process alternatives – example: seawater desalination

Jan 20 M; Martin Luther King Jr B'Day – No Classes Held
W; Strategy of Process Engineering by D. Rudd/C. Watson, **PROJECT 1 ASSIGNED**

PROJECT 1 ASSIGNED Wednesday Jan 22 : Carbon Dioxide Emissions Reductions for semi-Trailer rigs. Maximize ROI.SOLO (by yourself)



Soft F: cooling water towers – design and cost

Jan 27 M; show me the money – ~~fundamental effects, CH 6, 7,8~~
W; Report Writing Chapter 11 **PROGRESS MEMO DUE** C-4
Soft F: process examples p.67 etc Ch 3

Feb 3 M: heat transfer shell and tube/Reactors size and cost OX, olefins, NH3 CH 14
W: Tray Columns – size & cost CH 15
Soft F: Materials selection CH 10/Interviews

Feb 10M: Safety Concerns – HAZOP Analysis Ch2
W: **PROJECT 1 FINAL REPORT DUE, PROJECT 2 ASSIGNED (teams)**

PROJECT 2 ASSIGNED Wed Feb 12 (DESIGN FOR WATER, ELECTRICITY and the ENVIRONMENT)

ENVIRONMENTAL DREAM TEAM

Soft F; Plant Disasters – Examples, Flixborough etc

Feb 17: M: Crystallizers – size and cost (as a reactor kettle) CH13
W; Centrifugal Pumps – model, size and cost CH 12
Soft F; Corporate structure, Meetings

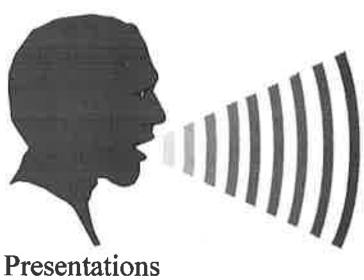
Feb 24 M: How to Give an Oral Presentation CH 11 C-4
W: Team Meetings with JRBoss **PROGRESS MEMO DUE** C-4
F: Team Meetings with JRBoss

Mar 3 M: Team Meetings with JRBoss
W: Team Meetings with JRBoss C-4
F: Team Meetings with JRBoss

Mar 10 : **SPRING BREAK (Break what? Wallets, bones?) or SPRING BRAKE (stop work?)**

Mar 17 M: **RESEARCH** – chem. Labs - chlorination of PVC, sour burp, solar storage
W: **DEVELOPMENT** – pilot plants – KZ, KX, solar storage
Soft F: **DESIGN** – hydrogen sulfide recovery plant

Mar 24 M: **PLANT OPERATION** - trouble shooting – POX, control, environment,
W: **PROJECT 2 DUE** Oral presentations start
F: Oral presentations



Apr 7 M, W, F Oral Presentations

Apr 14 M, W, F Alumni Speakers

Apr 21 M, W, F Oral presentations

Apr 28 M, W, F Oral presentations

FINAL COURSE GRADE

PROJECT 1 report	30%	C-1 and C-3
PROGRESS memos (both)	10%	
PROJECT 2 report	40%	C-1 and C-3
Home Work	10%	
Oral Presentation	10%	C-3
	100%	

Reports are due on time – late reports will be docked by a-grade-a-day policy

Academic Integrity (ethics)- You paid good money to take this design course so you must adhere to the rules of conduct (AIChE ethics based p.13 PTW) in order to achieve the maximum benefit of critical thinking and technical report writing. This course is a prelude to your first job after graduation. Your boss will not tolerate any form of dishonesty and nor will I. In other words, do your own work as required.

ARIZONA STATE UNIVERSITY
CHEMICAL ENGINEERING PROGRAM
SENIOR PROCESS DESIGN
CHE 462
Tentative Syllabus
Spring 2013
REVISED

Professor Beckman
BAC 215
ERC 291 M,W,F
9:00 – 9:50 AM
965-4395 Office Hours 10:00 – 11:00AM M,W,F

CHE 462: Process Design. 3 credits. Application of economic principles to optimize equipment selection, sizing and cost(design) of process systems. Prereq. CHE 432, CHE 433, CHE442 and everything else except labs and control courses!

FORMAT: **I'm your first boss and this is your first job.** You will be a design engineer in a company that is contracted by a client needing design assistance.

Think of alternatives

On the job environment

Involving group interaction

TEXTBOOK: Peters, Timmerhaus, and West, *Plant Design and Economics for Chemical Engineers, 5th* Edition, McGraw-Hill, 2003 (referred to as PTW)

REFERENCES:

Seader, Henley, *Separation Process Principles,* 2nd ed, John Wiley, 2006.

McCabe, Smith and Harriott, *Unit Operations of Chemical Engineering,* McGraw-Hill, 2001

Woods, Don *Process Design and Engineering Practice with Data for Process Design and Engineering Practice,* Prentice-Hall, 1995.

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Perry, ed, *Chemical Engineers Handbook,* all editions.

Seider, Seader and Lewin, *Product & Process Design Principles,* John Wiley, 2004.

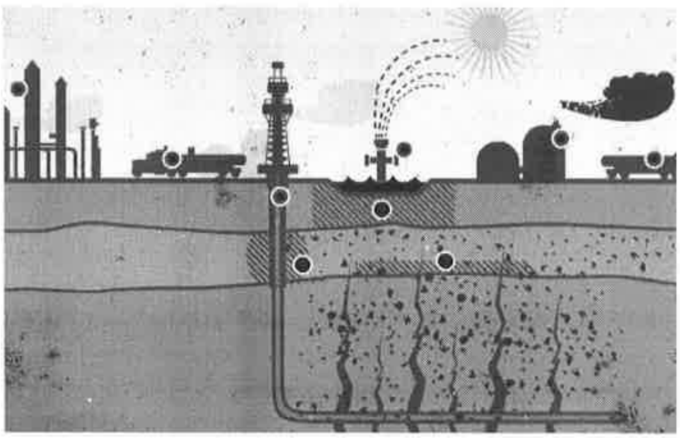
TOPICS BY WEEK:

Week of **Topics**

Jan 7 M; Introduction to Design, Generation of Alternatives (The Physics Exam) CH 1
W: Strategy of Process Engineering by D. Rudd/C. Watson
F; alternatives – Process synthesis CH 3 &4 example: lets make ammonia

Jan 14 M; show me the money – fundamental $ effects, CH 6, 7.
W; **Project 1 assigned (solo)**, review project 1 2012
s F; alternatives –example: seawater desalination, RO, MEE, MSF, VC, B&T, epsilon, tug

PROJECT 1 ASSIGNED Wed Jan 16 : FRACKING – Produced-Water Clean Up



Jan 21 M; **MLK no classes held**
W; Report Writing Chapter 11 C-4
s F; Corporate structure, meetings, interviews

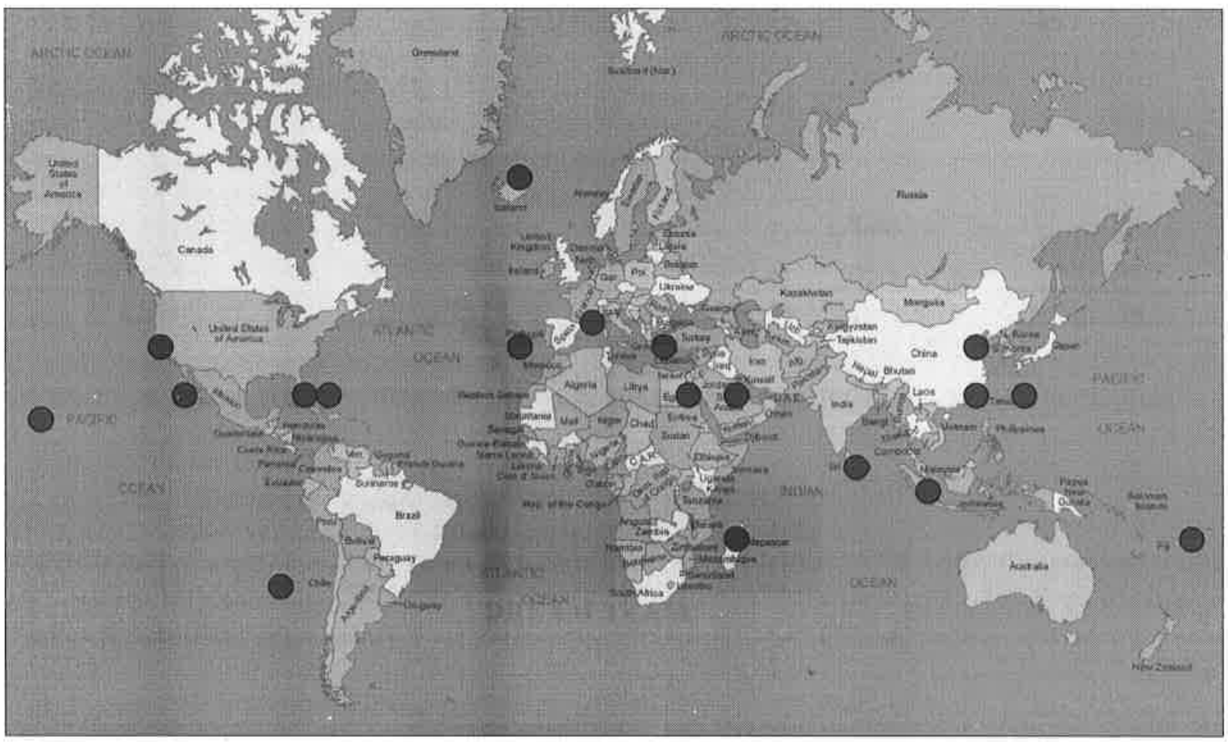
Jan 28: M: speaker 1 – Mr. David Burroughs SDC materials corp
W: speaker 2 – Mr. Hank Hamblin SRP **Progress Memo 1 due** C-4
F: speaker 3 – Ms. Stephanie Archabal ITSI Gilbane

Feb 4: M: speaker 4 – josh brown JACOBS
W; crystallizers CH 15 size and cost, PX plant, MSMPR, R-z, dryers, filter screens
F heat & mass transfer – water cooling tower mass transfer CH 15

Feb 11: M: tray columns size and cost
W: **Project 1 final report due (individual) - Project 2 assigned (teams)**
F: speaker 5 - Tammi Westall INTEL

PROJECT 2 ASSIGNED Wed Feb 13 ELECTRICAL ,WATER, AND FUELS PRODUCTION WITH ZERO NET CARBON DIOXIDE EMISSIONS ON PENINSULAS AND ISLANDS

DREAM TEAM



Feb 18 M; heat transfer reactors, shell and tube size and cost, furnaces CH 14,
W: ~~materials selection, pumps and blowers~~ CH 10,12
s F: how to give an oral presentation CH 11 C-4

Feb 25 M; **RESEARCH** – chem. Labs - chlorination of PVC, sour burp
W; **DEVELOPMENT** – pilot plants – KZ, KX, solar storage
s F; plant disaster examples – safety – calculations

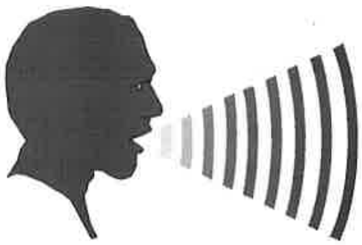
Mar 4 M; **DESIGN** -- hydrogen sulfide recovery plant , solar one night heat exchangers
W; **PLANT OPERATION** -trouble shooting – POX, control, environment, safety, ic4
Progress Memo 2 due
s F: project assistance in class

Mar 11 **SPRING BREAK (Break what? Wallets, bones?) or SPRING BRAKE (stop work?)**

Mar 18 M, W, F Group Design Review Meetings with JRB C-4

Mar 25 M, W, F Group Design Review Meetings with JRB

Apr 1 M: **PROJECT 2 DUE** Oral Presentations Begin:
W, Oral presentations
F: Oral presentations ?



Apr 8 M, W, F? Oral presentations continue

Apr 15 M, W, F? Oral presentations continue

Apr 22 M, W, F? Oral presentations continue

Apr 29 M; Oral presentations , final discussions

(class meetings end when all presentations are finished)

COURSE GRADE

PROJECT 1 report	40%	C-1 and C-3
PROGRESS memos (both)	20%	
PROJECT 2 report	30%	C-1 and C-3
Oral Presentation	10%	C-3
	100%	

Reports are due on time – late reports will be docked by a-grade-a-day policy

Academic Integrity (ethics)- You paid good money to take this design course so you must adhere to the rules of conduct (AIChE ethics based p.13 PTW) in order to achieve the maximum benefit of critical thinking and technical report writing. This course is a prelude to your first job after graduation. Your boss will not tolerate any form of dishonesty and nor will I. In other words, do your own work as required.

Entire Assignment is C-2 and C-3

ARIZONA STATE UNIVERSITY
CHEMICAL ENGINEERING PROGRAM
CHE 462
PROJECT 1 – INDIVIDUAL EFFORT & REPORT C-1

VIPER Corp

TO: CHE 462 WORLD CLASS DESIGN ENGINEERS

FROM: J.R.Boss, Vice Pres, R&D, VIPER Corp

DATE: 1/22/14

SUBJECT: DESIGN FOR REDUCED SEMI-TRACTOR TRAILER VEHICLE EMISSIONS

In 1997 an international meeting was held in Kyoto, Japan and 2012 in Doha, Bahrain to discuss the Global Warming trends(climate change) and remediation policies to curb carbon dioxide emissions. The climate change in global rising temperatures has also shifted the weather patterns throughout the world. A shift from conventional fuels to natural gas will significantly reduce carbon dioxide emissions. As an example, switching from diesel or gasoline to methane in transportation vehicles would reduce emissions by 25% for the same miles driven. Motor vehicles produce about 14% of the world carbon dioxide emissions so our attention will focus on CO_2 emissions reduction in semi trailers.

We at Vehicle Improved Performance Engineering Retrofitters Corp (VIPER) have been contracted by Reduced Emissions for diesel Semi Trailers LLC (REST LLC) to explore possibilities of reduced carbon dioxide emissions per mile. The only possibility that can not be investigated is storing braking energy into electrical storage (already on the market). Take as a basis, 150,000 miles/year driven. Also you can take carbon dioxide emissions reduction at $0.50/100MJ as a carbon credit.

You will work alone to explore the business venture details to be proposed by VIPER Corp to REST LLC which will reduce emissions in semi trailers. **The project objective is to maximize incremental ROI**. If needed, you can use a money borrowing rate of 5.4% with an equipment life of 17.4 years. This solo effort by 80 engineers will assure VIPER Corp of multitude design outcomes for future proposal consideration.

Your individual final design report must be on my desk (brought to class) by 9:00 AM Wednesday February 12, 2014. C-4

Also, there will be a **progress report** due on **Wednesday January 29** so as to help assure a strong steady pace of your dedicated participation.

C-4

Chemical Engineering
CHE 462
ASU 2/12/14
FIRST REPORT GRADING SHEET

TECHNICAL EXPERTISE: 10 pts each = 50%

1. **Identify contracting company of VIPER Corp.**
2. **Show that you followed the objective function.**
3. **Show that you can design a reasonable workable system.**
4. **Demonstrate life-long learning (WEB SITE references).**
5. **Solve problems involving contemporary issues(show evidence, news releases)**

GRAMMAR 50% (spelling, sentence structure, technical writing guidelines, memo format)

E2 + C-2. Entire Project

ARIZONA STATE UNIVERSITY
CHEMICAL ENGINEERING PROGRAM
CHE 462
PROJECT 2 – Team Effort
Individual reports combine to form the team report C-1

WEEP Inc

TO: CHE 462 CRÈME DE LA CRÈME DESIGN ENGINEERS

FROM: J. R. Boss, Board Chair, President and CEO, WEEP Inc

DATE: 2/12/14

SUBJECT: DESIGN FOR WATER, ELECTRICITY and ENVIRONMENT CONCERNS

The CaliZona Research Academy Partners has contracted with us here at WATER ENERGY and ENVIRONMENTAL PROCESSING Inc (WEEP Inc) to explore the **economic feasibility (Maximize Return on Investment)** of improving the environment in California and Arizona. Projects of particular interest include:

1. Reduction of water consumption/kWh in Arizona electrical power generating stations
   - How much water is consumed per kWh?
   - Where in the plant is the water used (consumed or discharged)?
   - Water constant but increase electrical generation?
   - Select your piece of the project pie
2. Reduction of salt content in the Salton Sea
   - Salt is over 4.5wt% - reduce to ocean salinity
   - What to do with the salt? Haul away? Sell? Bury?
   - Rate of cleaning?
   - Select your piece of the project pie
3. Supplying potable water from the Sea of Cortez to Phoenix
   - Desalinate the ocean?
   - Pipe transport? Canal flow?
   - Tucson deal/exchange?
   - Select your piece of the project pie
4. Harvest methane clathrates from the West coast continental shelf- make electricity and supply dry 1000psi methane gas to California
   - Clathrates/hydrates? Guest molecule?
   - No carbon dioxide emissions. Sequester methods?
   - Select your piece of the project pie
5. Turning landfill garbage into electricity and methane
   - Pressure?
   - Dehydrate methane?
   - Compress to 1000psi?

- Dehydrate methane?
- Carbon dioxide removal? Sequester?

Various resources are available for your consideration. Resources include but are not limited to solar, wind, waves, tidal action, ocean water, ocean depth, ocean chemical components, land elevation and so forth. Electrical sales can be made locally at US$ 0.15/kWh). Water values are set at $4.00/1000 gallons (US$ 1.00/cuM) and methane can be sold at $0.50/therm. Equipment purchases will be based on PTW design text unless otherwise agreed to by JRBoss. Land cost needed for the plant site will be locally valued. Calculations must include amortized equipment and land costs. You can use a money borrowing rate of 4.5% with an equipment life of 23 years.

Find news releases concerning your topic. The articles will establish a keen interest in and a need for this most exciting project!

You will assemble into teams of four members and start your brain storming NOW. Having 21 teams will help assure that WEEP Inc. can deliver to CaliZona many possible choices for the future consideration. **Today:**

- **give me a memorandum (all team members names and name of the team.**
- **Receive your team assignment from JR Boss)**
- **Give me a memo that reflects your initial brain storming. Also give insight into how the team will divide up individual responsibilities** in solving the open ended design problem. Note that there will be some grading as a team but you will be mainly graded individually on your section of (contribution to) the project. C-1

Your final design report must be on my desk by 9:00 AM Monday March 31, 2014. Also, there will be a **progress report** due on **Monday February 24** to help assure an active start and a strong steady pace of your dedicated participation. C-4

Chemical Engineering
CHE 462
ASU 3/31/14

C-4

SECOND REPORT GRADING SHEET

TECHNICAL EXPRESSION: 5 pts each = 50%

1. **Can function on multidisciplinary teams (che4.1) (state team interaction)**
2. **Have knowledge of ethics & professionalism (che 4.4) (a brief paragraph how you did your own work and note others help)**
3. **Understand impact of solution on society(che 4.3) (your work)**
4. **Demonstrate life-long learning (WEB references) (che 5.1)**
5. **Have knowledge of contemporary issues(show evidence, news releases of water, electricity and/or fuels needs). (che 4.4)**
6. **Can design, analyze, and control processes (8) (detailed calculations in appendix)**
7. **Can follow the objective function (max ROI)**
8. **Copies of all Oral Presentation slides**
9. **Perform HAZOP analysis on one process entity**
10. **Team name and team members**

GRAMMAR &TECHNICAL DETAILS 50% (spelling, sentence structure, memo format, clarity, knowledgeable, accuracy)

C-4

CHE 462 ORAL GRADING SHEET 2014

STUDENT____________________

1. **Clarity of text and approach**
   what was done, why and how
2. **Presentation of Results**
   key results, significance
3. **Knowledge of topic**
   explanations, answers to questions
4. **Speaking effectiveness**
   Articulation/Vocabulary
   Speech volume and speed
   Audience eye contact
5. **Visual Aids Effectiveness**
   Outlines, summary, Figures, Tables

10 points for each category then times 2 for grade

CHE 462 ORAL GRADING SHEET 2014

STUDENT____________________

1. **Clarity of text and approach**
   what was done, why and how
2. **Presentation of Results**
   key results, significance
3. **Knowledge of topic**
   explanations, answers to questions
4. **Speaking effectiveness**
   Articulation/Vocabulary
   Speech volume and speed
   Audience eye contact
5. **Visual Aids Effectiveness**
   Outlines, summary, Figures, Tables

10 points for each category then times 2 for grade

C2 + C3: Entire Assignment

ARIZONA STATE UNIVERSITY
CHEMICAL ENGINEERING PROGRAM
CHE 462
PROJECT 1 – INDIVIDUAL EFFORT & REPORT C-1

L'Eau Co.

TO: CHE 462 WORLD CLASS DESIGN ENGINEERS

FROM: J.R.Boss, Vice Pres, R&D, L'Eau Co.

DATE: 1/16/13

SUBJECT: DESIGN FOR PRODUCED WATER RECLAMATION

In 1997 an international meeting was held in Kyoto, Japan and 2012 in Doha, Bahrain to discuss the Global Warming trends and remediation policies to curb carbon dioxide emissions. The climate change in global rising temperatures has also shifted the weather patterns throughout the world. A shift from conventional fuels to natural gas will significantly reduce carbon dioxide emissions. As examples, switching from gasoline to methane in transportation vehicles would reduce emissions by 25% for the same miles driven. Switching from coal to methane in electric power generating plants would save over 50% of carbon dioxide emissions while producing the same amount of electricity. The newly tapped methane resource has been identified in underground shale formations throughout the United States. The method for mining the natural gas is called hydraulic fracturing or fracking. However, fracking is accompanied by water pollution issues.

The Fracking American Natural Gas Inc (FANG Inc) currently produces methane with 100,000 gallons/day of produced water which costs $0.13/gallon to be hauled away. The produced water essentially contains 6wt% sodium chloride, 1wt% ethanol, and 1.3wt% acetic acid. We at L'Eau Co. are proposing to take care of the FANG Inc water problem for them at our cost to them of $0.06/gallon thereby saving FANG Inc almost $3 million/year.

You will work alone to explore the business venture details to be proposed by L'Eau Co. which will reduce the amount of produced water that must be disposed of at $0.13/gallon. Potable water made in this venture can be sold at $2/1000 gallons and organics must be disposed of or sold as a by-product(s). **The project objective is to maximize ROI**. Use a money borrowing rate of 5.4% with an equipment life of 17.4 years. The solo effort will assure L'Eau Co. of multitude design outcomes for proposal consideration.

Your individual final design report must be on my desk by 9:00 AM Wednesday February 13, 2013. Also, there will be a **progress report** due on **Wednesday January 30** so as to help assure a strong steady pace of your dedicated participation. C-4

C-4

Chemical Engineering
CHE 462
ASU 2/13/13
FIRST REPORT GRADING SHEET

TECHNICAL EXPERTISE: 10 pts each = 50%

1. **Identify contracting company of L'Eau Co.**
2. **Show that you followed the objective function**
3. **Show that you can design a reasonable workable process**
4. **Demonstrate life-long learning (WEB SITE references)**
5. **Solve problems involving contemporary issues(show evidence, news releases)**

GRAMMAR 50% (spelling, sentence structure, technical writing guidelines, memo format)

C-2 + C-3: Entire Assignment

ARIZONA STATE UNIVERSITY
CHEMICAL ENGINEERING PROGRAM
CHE 462
PROJECT 2 – Team Effort
Individual reports combine to form the team report C-1

GRIPE Inc

TO: CHE 462 CRÈME DE LA CRÈME DESIGN ENGINEERS

FROM: J. R. Boss, Board Chair, President and CEO, GRIPE Inc

DATE: 2/13/13

SUBJECT: DESIGN FOR CARBON DIOXIDE-FREE UTILITIES

The Peninsula And Island Necessities LLC(PAIN LLC) has contracted with us here at Grass Roots International Process Engineering Corp (GRIPE Inc) to explore the **economic feasibility (Maximize Return on Investment)** of producing electricity (24 hr/day), liquid fuel, gaseous fuel and potable water with no carbon dioxide emissions. PAIN LLC is particularly interested in the island and peninsula regions throughout the world. The electrical generating station will be sized as a net 10MWe facility for 24 hours operation. Water will be produced at a rate of 5000 BBL/day. Liquid fuel regulations require 100BBL/day or Gaseous fuels demand is 10,000 SCF/day.

You are to select a specific site for the combined facility on an assigned peninsula or island. Various resources are available for your consideration. Resources include but are not limited to solar, wind, waves, tidal action, ocean water, ocean depth, ocean chemical components, land elevation and so forth. Electrical sales can be made locally at US$ 0.13/kWh). Water sales are set at $3.00/1000 gallons (US$ 0.75/cuM). Equipment purchases will be based on PTW design text unless otherwise agreed to by JRBoss. Land cost needed for the plant site will be locally valued. Calculations must include amortized equipment and land costs. Use a money borrowing rate of 4.5% with an equipment life of 23 years.

Find news releases concerning the world wide water, gaseous fuels, liquid fuels and electrical needs and shortages. The articles will establish a keen interest in and a need for this most exciting project!

You will assemble into teams of four members and start your brain storming NOW. Having 19 teams will help assure that GRIPE Inc. can deliver to PAIN LLC many possible choices for the future plant facility. **Today, give me a memorandum (all team members names and name of the team)** that reflects your initial brain storming. **Also give insight into how the team will divide up individual responsibilities** in solving the open ended design problem. Note that there will be some grading as a team but you will be mainly graded individually on your section of (contribution to) the project. C-1

Your final design report must be on my desk by 9:00 AM Monday April 1, 2013. Also, there will be a **progress report** due on **Monday March 4** to help assure an active start and a strong steady pace of your dedicated participation. C-4

C-4

Chemical Engineering
CHE 462
ASU 4/1/13
SECOND REPORT GRADING SHEET

TECHNICAL EXPRESSION: 5 pts each = 50%

1. **Can function on multidisciplinary teams (che4.1) (state team interaction)**
2. **Have knowledge of ethics & professionalism (che 4.4) (a brief paragraph how you did your own work and note others help)**
3. **Understand impact of solution on society(che 4.3) (your work)**
4. **Demonstrate life-long learning (WEB references) (che 5.1)**
5. **Have knowledge of contemporary issues(show evidence, news releases of water, electricity and/or fuels needs). (che 4.4)**
6. **Can design, analyze, and control processes (8) (detailed calculations in appendix)**
7. **Can follow the objective function (max ROI)**
8. **Copies of all Oral Presentation slides**
9. **Perform HAZOP analysis on one process entity**
10. **Team name and team members**

GRAMMAR &TECHNICAL DETAILS 50% (spelling, sentence structure, memo format, clarity, knowledgeable, accuracy)

C-4

2013

CHE 462 ORAL GRADING SHEET
STUDENT____________________

1. **Clarity of text and approach**
   what was done, why and how
2. **Presentation of Results**
   key results, significance
3. **Knowledge of topic**
   explanations, answers to questions
4. **Speaking effectiveness**
   Articulation/Vocabulary
   Speech volume and speed
   Audience eye contact
5. **Visual Aids Effectiveness**
   Outlines, summary, Figures, Tables

CHE 462 ORAL GRADING SHEET
STUDENT____________________

1. **Clarity of text and approach**
   what was done, why and how
2. **Presentation of Results**
   key results, significance
3. **Knowledge of topic**
   explanations, answers to questions
4. **Speaking effectiveness**
   Articulation/Vocabulary
   Speech volume and speed
   Audience eye contact
5. **Visual Aids Effectiveness**
   Outlines, summary, Figures, Tables

C-4

Lenore Dai

From: James Beckman
Sent: Friday, January 09, 2015 8:57 AM
To: Lenore Dai
Subject: RE: General Studies Courses Losing Designations AND Major Maps

yes. the first report is graded by ME and returned to the class within a week - well ahead of the second report due date.
jim

From: Lenore Dai
Sent: Thursday, January 08, 2015 4:32 PM
To: James Beckman
Subject: RE: General Studies Courses Losing Designations AND Major Maps

Wonderful and thank you so much! Would it be possible to me to say something like that the first project report was graded and returned to the students prior to the submission of the second project report? Thanks again!!!

Plant Design and Economics for Chemical Engineers

Fifth Edition

Max S. Peters
Klaus D. Timmerhaus
Ronald E. West
University of Colorado

McGraw Hill

Boston Burr Ridge, IL Dubuque, IA Madison, WI New York San Francisco St. Louis
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CONTENTS

Because applied economics and plant design deal with practical applications of chemical engineering principles, a study of these subjects offers an ideal way for tying together the entire field of chemical engineering. The final result of a plant design may be expressed in dollars and cents, but this result can only be achieved through the application of various theoretical principles combined with industrial and practical knowledge. Both theory and practice are emphasized in this book, and aspects of all phases of chemical engineering are included.

The authors are indebted to the many industrial firms and individuals who have supplied information and comments on the material presented in this edition. The authors also express their appreciation to the following reviewers who have supplied constructive criticism and helpful suggestions on the presentation for this edition: Luke Achenie, University of Connecticut; Charles H. Barron, Clemson University; James R. Beckman, Arizona State University; David C. Drown, University of Idaho; Steinar Hauan, Carnegie Mellon University; Marianthi Ierapetritou, Rutgers University; Jan A. Puszynski, South Dakota School of Mines and Technology; Johannes Schwank, University of Michigan; Thomas L. Sweeney, Ohio State University; Eric J. Thorgerson, Northeastern University; and Bruce Vrana, Dupont Engineering Technology.

Acknowledgment is made to Barr Halevi, HBarr, Inc., for his many contributions to the text and his preparation of Chap. 5 and much of Chap. 13. Special thanks are also expressed to L. T. Fan, Kansas State University, and F. Friedler, Veszprem University, for their preparation of the "Algorithmic Flowsheet Generation" section in Chap. 4. The assistance in typing of the manuscript by Cynthia Ocken, CSLR University of Colorado, and Ellen Romig, chemical engineering department, University of Colorado, is greatly appreciated.

Max S. Peters
Klaus D. Timmerhaus
Ronald E. West