

# **Western New England College**

## **School of Engineering**

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## **Grand Challenge Scholar Program**

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## **Grand Challenges Scholars Program Vision and Curricular Plan for Western New England College**

Western New England College, as quoted from Our Mission, is 'a truly comprehensive institution whose faculty and staff have historically collaborated in offering an integrated program of liberal and professional learning in diverse fields of arts and sciences, business, engineering, law, and pharmacy.' This lends itself to a unique blending of Our Core Values and the principles of the National Academy of Engineering (NAE) Grand Challenge Scholars Program.

Specifically, Grand Challenge Scholar goals can be brought together with our diverse course offerings in our professional schools; ASCSB accredited School of Business, ABET accredited School of Engineering, School of Arts and Sciences, School of Pharmacy, and ABA accredited School of Law. Our college-wide core requirements also include two required Learning Beyond the Classroom (LBC) experiences that allow students to pursue their individual interests through participation in a wide variety of undergraduate research experiences as well as service learning opportunities.

### **1) Research Experience**

- a.** Participate in an approved team or individual year-long Senior Design Project, in the Grand Challenge (GC) area. Complementary research experiences, such as approved internship, NSF REU (Research Experience for Undergraduates) or other research activity such as in-house faculty-sponsored or company-sponsored research projects, are strongly encouraged.

### **2) Interdisciplinary Curriculum**

- a.** Build on the Western New England College (WNEC) General College Requirements (GCR) / General Education Requirement courses plus selected electives to provide an interdisciplinary outlook to search for innovative solutions to grand challenge problems.
- b.** Examples:
  - i.** **Area of public policy** – POSC101 Introduction to Contemporary Global Issues (GNED XXX –Social & Behavioral) *plus* POSC 205 Public Administration
  - ii.** **Area of ethical concerns** – MAN 240 Business and Society (Note from 2010-11 catalogues: 'This course can be taken to fulfill the PH211 requirement.') (PH XXX- Ethical ; PH courses except PH110 and PH204)
  - iii.** **Area of business issues** – ILP 230/SUS230 Business and the Global Environment *or* ILP 336/SUS 336 Global Warming
  - iv.** **Interest in Technology for Learning** – PSY 101 Introduction to Psychology *plus* PSY 201 Developmental Psychology *plus* PSY 313 Learning *or* PSY 304 Educational Psychology

### 3) Entrepreneurship

- a. Build foundation with formal coursework
  - i. **Entrepreneurial theory and practice** - ME 423 Product Development and Innovation *plus* MAN 251 Entrepreneurship and Innovation
- b. Options (*select one*) for “Theory into Practice” experience
  - i. Directed ‘real-world’, case study created by the student through interviews with selected entrepreneurs from local area businesses, e.g., new idea to market, scientific laboratory to viable product, breakout from large company to market, etc.
  - ii. Shadow business person/people to get perspective on ‘business’ aspects of running a business and ‘compare and contrast’ different stages of entrepreneurial ventures.
  - iii. Participate in a Grand Challenge-related project in the Association of Business, Engineering, and Science or a similar activity at WNEC or through other student chapters of professional societies.

### 4) Global Dimension

- a. Build on the WNEC General College Requirements (GCR) / General Education Requirement courses
  - i. **Global issues** - HIST 201 Technology and Society, *recommended* (HIST XXX –Historical) and the CUL XXX Culture/Art perspective (latter will include Global perspective in the 2011-12 catalogue)
- b. Attend International Business Breakfast series (sponsored by the School of Business)
- c. *Optional*: Complete Learning Beyond the Classroom (LBC) through any one of the following activities with focus in a grand challenge area
  - i. ‘An approved international study abroad program/internship’
  - ii. ‘An internship/research experience with significant global focus’

### 5) Service Learning

- a. Participate for one or more year(s) in a leadership activity with significant training component at WNEC
  - i. Examples: Peer Advisors, Supplemental Instructor, Academic Progress Monitor with the Office of First Year Students and Students in Transition, officer in student club/professional society/honor society with attendance at student leadership conference or other approved activity
- b. Or significant and sustained volunteer activity such as volunteering in public schools; several outreach activities, etc. with approval
- c. Or participating in service trip, e.g. Alternative Spring Break, Outreach in Guatemala, Engineering without Borders, Engineering World Health.

## SUMMARY of Five Grand Challenges Curricular Components

Curricular Components	Requirements		
<b>Research Experience</b>	Senior Design project (individual or team) related to GC theme or problem.		
<b>Interdisciplinary Curriculum</b>	<i>General Education Requirement (GCR)</i>	<i>GCR Course</i>	<i>Plus</i>
<b>Public Policy</b>	GNEB XXX- Social & Behavioral	<b>POSC 101</b>	<b>POSC 205</b>
<b>Ethical Concerns</b>	PH XXX – Ethical; PH courses except PH110 and PH204	<b>MAN 240</b>	
<b>Business Issues</b>	ILP XXX- Integrated Liberal & Professional	<b>ILP 230/ SUS 230</b> Or <b>ILP 336 / SUS 336</b>	
<b>Technology for Learning (Optional)</b>	GNEB XXX- Social & Behavioral	<b>PSY 101</b>	<b>PSY 201;</b> <b>PSY 313 or</b> <b>PSY304</b>
<b>Entrepreneurship</b>	<i>Courses</i>	<b>ME423</b>	<b>MAN 251</b>
	<i>'Theory into Practice' experience</i>	Develop case study on entrepreneur / entrepreneurial business or shadow/reflection different business leaders or ventures or participate in GC-related project (e.g. ABESE)	
<b>Global Dimension</b>	<i>General Education Requirement (GCR)</i>	<i>GCR Course</i>	<i>Plus</i>
	HIST XXX- Historical Perspective	<b>HIST 201</b> (recommended)	
	CUL XXX Culture/ Art Perspective	<b>** Will include Global perspective in 2011-12</b>	
	LBC Requirement	Study abroad / internship /research	
	Attend International Business Breakfast series		
<b>Service Learning</b>	Leadership activity at WNEC		
	<i>Or</i> significant and sustained volunteer activity		
	<i>Or</i> Alternative Spring Break or service trip		

**\*\* All General Education Requirements satisfied**

## **Selection of Grand Challenges Scholars and Anticipated Involvement**

All engineering students will be invited to participate in the Grand Challenges Scholars program the during freshman year with *'full'* appointment occurring during the junior year. Each academic year will require the completion of tasks with increasing involvement in the program, culminating with the Senior Design Project and/or significant research experience in a Grand Challenges area.

GC scholars will be appointed by the Program Director upon the recommendation from a committee comprised of his/her academic advisor, Assistant Dean and an at-large member (e.g., WNEC faculty outside of the School of Engineering, WNEC staff member, industrial advisor, or alumni). This committee will review and assess required materials, the portfolio, and present/future plans. The committee will also suggest activities, projects, internships/REU to promote the intramural and extramural activities in the GCSP.

A summary of the four-year participation and appointment process is as follows.

*Freshman year-* All students are invited to explore possibilities of Grand Challenge Scholars Program (GCSP). Students complete a brief application to inform their academic advisor and the program director of their interest.

*Sophomore year-* Students apply for *'conditional'* appointment to GCSP with a second application and present their portfolio with evidence of their initial commitment freshman year.

*Junior year-* Students apply for *'full'* appointment to GCSP with a proposal and academic plan for completing research and course requirements. The students will present their portfolio with evidence of commitment and work completed.

*Senior year-* Students meet with their academic advisor and GCSP director/committee to assess progress, past and future, to assure GCSP requirements are met and documented. The students will present their portfolio with evidence of commitment and work completed.

After freshman year, *'conditional'* and *'full'* appointment into the Grand Challenges Scholars Program and continuation will be 'based on achieving and maintaining a minimum 2.7 cumulative GPA, satisfactory academic progress, selective service status, if required, and full-time status.'<sup>1</sup> [<sup>1</sup>WNEC 2010-11 catalogue (pg. 400) for Presidential Scholars Award. Students do not have to be Presidential Scholars to participate.] It is strongly suggested the student maintain a minimum 2.7 major and cumulative GPA. Additionally, the committee will review student's materials to determine that all requirements are met, and subsequently grant approval for continuation and /or completion of the GCS program.

The goal at WNEC is to have at least one GCSP student per one of our four majors per year for a total of 16 students in the program at one time. A maximum number of students at WNEC would be 32, i.e., two per major per year.

## **Plans for WNEC to meet the five Grand Challenges curricular components**

In general, five GC curricular components will be satisfied through careful selection of General College Requirement courses and electives, LBC activities, in-house or academic (REU) or industrial research projects, Senior Design project, and intramural and extramural activities. Students will document all work in a portfolio, which will be started freshman year and completed upon graduation with submission to NAE Grand Challenges Program.

*Freshman year-* All students are invited to explore possibilities of Grand Challenge Scholars program. At this time, students will be required to attend several events relevant to five points in Grand Challenges and start a portfolio with brief essays reflecting on these activities. (Such activities may include one or more of the following: attend School of Engineering symposiums, attend International Business Breakfast series, contact with alumni through Alumni Mentoring Program (ENGR102), write a focused essay on engineering career (ENGR102), join a student service or professional club, and identify student leadership opportunities at WNEC.

*Sophomore year-* Students have a ‘conditional’ appointment to GCSP. During sophomore year, some of the General College Requirements will be selected and students should become involved in a service activity, previously identified. At the end of the year, students should try to identify an area of interest, travel abroad, or apply for an REU, or internship in a GC area.

*Junior year-* Students have earned a ‘full’ appointment to GCSP. Students have demonstrated a serious and documented interest in the GCSP by submitting a portfolio, proposal, and academic plan for completing research and course requirements.

During junior year, some of the General College Requirements will be selected and students should continue to be involved in a service activity striving for a leadership role, previously identified. Also maintain portfolio with documentation of GCR courses / electives (engineering or non-engineering); complete LBC in GC area; apply for and secure a summer internship, REU or travel abroad activity. At the end of junior year, the GCSP student should identify her/his Senior Design Project and area of interest. This is critical since the Senior Design Project will be one academic year in length and begin in the fall semester.

*Senior year--* Students with a ‘full’ appointment to GCSP and have maintained the required GPA and portfolio. Students will continue to meet with their academic advisor and GCSP director/committee to assess progress, past and future, to assure GCSP requirements are met and documented for graduation.

During senior year, the student will focus on Senior Design project in a GC area. Use portfolio to reflect on interdisciplinary components of project, specifically using ‘theoretical knowledge’ from GCR courses/electives. Design outreach activity from Senior Project to meet service requirement of GCSP and present to selected audience (complements WNEC outreach to local high schools). Submission of portfolio

provides the evidence to be fully accepted as a Grand Challenge Scholar and receive this designation from the National Academy of Engineering (NAE).

### Assessment and Tracking of Grand Challenges Scholars at WNEC

- **Plan** for promotion early student engagement in GC-related activities
- **Plan** for intramural and extramural networking among GC scholars

The Grand Challenges Scholars program will employ a Program Director, who is responsible for the program’s general oversight, as well as, the student’s academic progress toward completion of the five curriculum components. The Program Director will be assisted by a committee comprised of the student’s academic advisor, Assistant Dean and an at-large member (not necessarily from the School of Engineering or faculty). This committee will review and assess the progress and competency of the student, by reviewing the portfolio and the academic program degree audit. The committee will also suggest activities, projects, internships/REU to promote the intramural and extramural activities in the GCSP. The use of a portfolio will be the key piece of documentation that ties all the components together to reach the primary outcome of the GCSP, the multidisciplinary, socially conscious, ethical engineer!

### SUMMARY of Assessment based on Content of the Student Portfolio

<b>Student Name:</b>					
<b>Engineering major:</b>					
<b>Grand Challenge Focus:</b>					
<b>Grand Challenge Advisor and Committee:</b>					
<b>Year</b>	<b>Research Experience</b>	<b>Interdisciplinary Curriculum</b>	<b>Entrepreneurial Component</b>	<b>Global Perspective</b>	<b>Service Learning</b>
<i>Freshman</i>		✓Identify GCR course (Outline of 4-year academic schedule)		✓Attending symposium with global focus (Reflection paper(s))	✓Joining a student club; volunteer in community through WNEC (Documentation and brief statement)

<i>Sophomore</i>		✓ Completing GCR courses (Achieve B- or better)	✓ Identifying entrepreneurs or ventures for case study. (Documentation and brief statement)	✓ Completing GCR courses (Achieve B- or better); Attending symposium / meeting with global focus (Reflection paper(s))	✓ Having leadership role in student club; become a TA, SI, RA, PA, etc. (Documentation and brief statement)
<i>Junior</i>	✓ Participating in faculty sponsored research; REU industrial internship (Reflection paper / final report)	✓ Completing GCR courses (Achieve B- or better)	✓ Completing courses (Achieve B- or better); writing case study on entrepreneur or ventures (Reflection paper(s))	✓ Completing GCR courses (Achieve B- or better); Complete study abroad, <i>if selected</i> . (Reflection paper(s))	✓ Having leadership role in student club; become a TA, SI, RA, PA, etc. (Documentation and brief statement)
<i>Senior</i>	✓ Completing Senior Project (Achieve B or better and reflection paper tying research to other areas in Grand Challenges.)	✓ Completing GCR courses (Achieve B- or better)	✓ Completing courses (Achieve B- or better)	✓ Completing GCR courses (Achieve B- or better)	✓ Having leadership role in student club; become a TA, SI, RA, PA, etc. (Documentation and brief statement)

Recruitment activities will begin with all engineering freshmen, who will be invited to explore the GCSP opportunity with information being presented in ENGR102 Engineering First Year Seminar as well as in the student chapter meetings of our engineering professional societies. Also a Kick-off Event will be held mid-October of the fall semester and a follow-up event will be held early in February to inform students of this opportunity. One of the objectives in these events is to show how easily the GCSP blends with their existing curriculum and involvement in campus-wide activities. As GCSP program expands, current participants will be able to share their experiences in a peer-to-peer manner.

Additionally, printed materials, i.e., a brochure and posters, and a website will be developed to advertise the GCSP mission, opportunities in GC areas, examples of possible student curriculum and the intramural and extramural activities to fulfill the GCSP requirements. When available, student and/or faculty testimonials will be



added. The Marketing Department in The School of Business will be a valuable asset in this endeavor.

At the present time, financial support for our Grand Challenge Scholars will come from the budgets existing WNEC departments and programs. Students with outstanding academic records, thus with the potential to be GC scholars, are often awarded Presidential Scholarships by the college. Students retain their scholarship by maintaining the required minimum 2.7 GPA, matching the GCSP requirement. The School of Engineering and its faculty sponsor paid undergraduate research opportunities, both during the academic year as well as in the summer that GC scholars may choose to take advantage of. WNEC has established relationships with local industry, which may also provide students with a monetary incentive or compensation to promote study in the GC areas. WNEC student activities group also provide funding for students to attend leadership and/or technical workshops and conferences. As the GCSP grows, the School of Engineering will work diligently to secure funding in scholarships, through research grants and college/industry collaborations in order for students to pursue their interests in the Grand Challenges areas, and as Grand Challenge Scholars.