Global Learning Programs in the Mechanical & Aerospace Engineering (MAE) Department at West Virginia University (WVU)

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Introduction and Brief Background

- *I will describe the study abroad / Global Learning programs in my MAE Department, with main focus on the exchange program between WVU and the University of Rome Tor Vergata (UTV).*

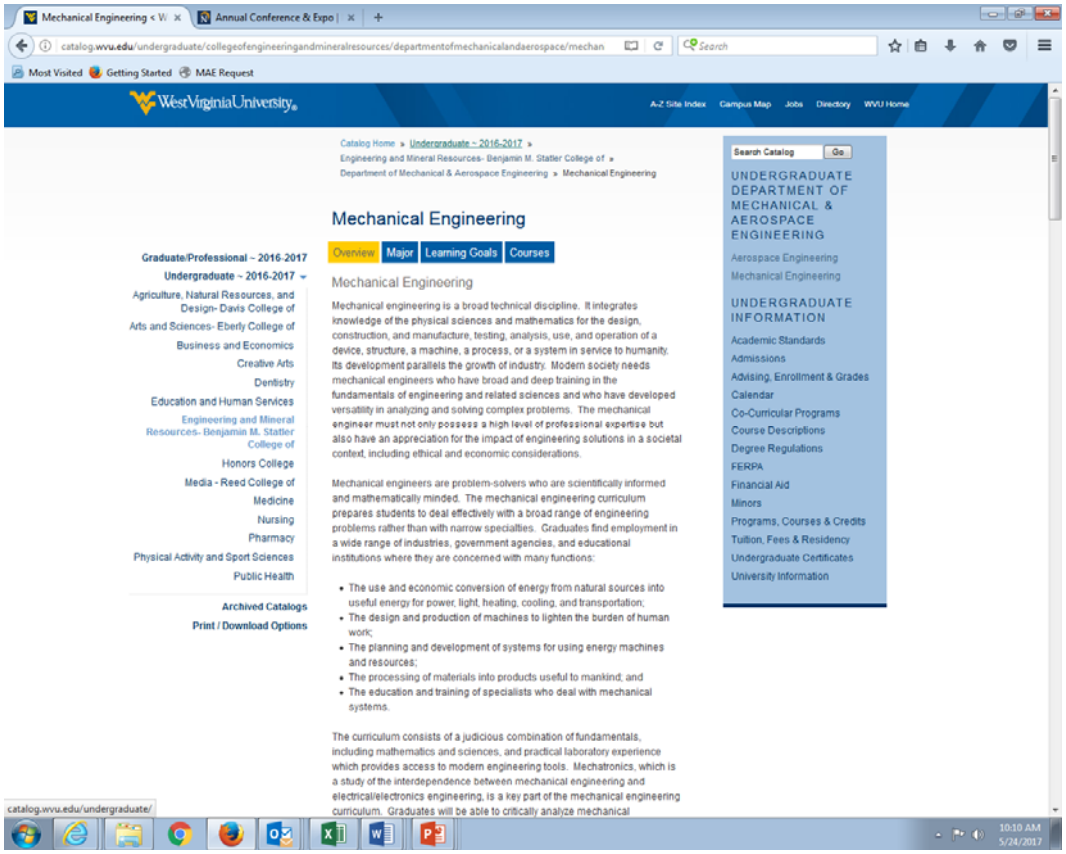
- *The UTV program is currently in its 7th year. I worked to renew the initial 5-year agreement in spring/summer of 2015, and I tutored 2 WVU BSAE students at UTV for 6 weeks at that same time.*

Introduction and Brief Background

- *The WVU-UTV study abroad exchange program was established in 2000 by Drs. Mirdul Gautam, Ever Barbero, & Victor Mucino, of the WVU and Drs. Stefano Cordiner, Roberto Verzico, & Vincenzo Mulone of UTV.*

- *UTV decided to establish a 3-year BS degree program in Engineering Science to be taught fully in English by the UTV faculty – helps their program & their students, too.*
- *The first WVU students went to UTV in spring term of 2013, after UTV had established all courses for the 3-year program.*
- *UTV sends 4th-year (beginning MS) or PhD students to MAE each fall semester. (very high-quality students)*
- *Getting all course equivalencies approved by the MAE faculty ensures that WVU students know what required courses they will earn credit for when they apply to the program. (Plus, there is the Location, as well as courses being taught in English!)*

WVU MAE Study Abroad Program at University of Rome Tor Vergata is Fully Described in Current WVU Catalog



- *Full details of the MAE/UTV study abroad program, including the course equivalencies (see next slide, or handout materials) are given at this web page.*

Course Equivalencies

All course equivalencies have been approved by MAE Department Curriculum Committees; these are documented in the WVU Catalog:

University of Rome Tor Vergata (UTV) Courses		Receive Credit for West Virginia University (WVU) Courses:		
UTV Course Title:	**US Credits:**	**WVU Course:**	**WVU Course Title:**	**Credit Hours:**
Thermodynamics & Heat Transfer	6	MAE 320	Thermodynamics, and:	3
		MAE 423	Heat Transfer	3
Energy Systems	4	MAE 321	Applied Thermodynamics	3
Machine Design	6	MAE 343	Intermediate Mechanics of Materials, and:	3
		MAE 454	Machine Design & Manufacturing	3
Manufacturing Technologies	6	IENG 302	Manufacturing Processes	2
Feedback Control Systems	6	MAE 460	Automatic Controls	3
Mechanics of Materials & Structures	6	MAE 243	Mechanics of Materials, and :	3
		MAE 495	Indepndnt Study: Intro to Structures	3
Analog Electronics	6	MAE 495	Indepndnt Study: Analog Electronics	3
Dynamics of Fluids**	4	MAE 495	Indepndnt Study: Intermd. Fluid Mech.	3
Kinematics & Dynamics of Mechanisms*	6	MAE 342	Dynamics of Machines, and :	3
		MAE 495	Indepndnt Study: Adv. Kinematics of Machns.	3
Electrical Network Analysis*	6	EE 221	Introduction to Electrical Engineering	3
Fluid Machinery*	4	MAE 495	Indepndnt Study: Intro to Turbomachinery	3
			Total Credits Available to be Taken:	44
** Taught in Italian				
* Taught only in the fall semester				

Students typically can transfer back 15-18 credits towards their BSME or BSAE degree.

We reviewed course syllabi, texts, lecture notes, and problem session materials during the course approval process, with much help from UTV.


Study Abroad Program for WVU
Mechanical Engineering Students!
Spend the spring term of your junior year studying in Rome, Italy!
Engineering courses are taught in English at the University of Rome,
Tor Vergata
Pay your usual WVU tuition and fees to WVU.
Housing and living expenses are roughly equivalent to here in US.
Expect to transfer a full semester of engineering course credits
back to WVU.

Additional STEM Global Learning Programs in MAE

1.) Industrial Outreach Program in Mexico: *8-week student internship in industry in Querétaro, Mexico, developed and led for the past 20 years by Dr. Victor Mucino of MAE.*

The MAE students each live with a Mexican family during the program. They are teamed with Mexican ME undergrads, and each team is placed at a local industry (Tremec; Bombardier, etc.) and assigned a technical problem to solve. Teams make final presentations to their companies. Mexican MSME students also spend a semester studying at WVU each year as a part of this program.

See link at: http://industrialoutreachmexico.wvu.edu.

(WVU students earn 6 MAE hrs. (Sr. capstone + ME Tech. Elective), plus 3 General Ed. hrs., with a ~$7-8K cost to student.)

Additional STEM Global Learning Programs in MAE

2.) Greece International Research Experience: *6-week student research experience at University of Crete FORTH, developed and led for the past 4 years by Dr. Kostas Sierros of WVU MAE.*
See link at: http://greeceires.wvu.edu/. *(WVU students earn 3 hr. MAE Tech. Elective, with a ~$3.5K cost to student.)*




Additional STEM Global Learning Programs in MAE

3.) Double-MSAE Degree Program with the Aeronautical University of Querétaro (UNAQ): *This new program was only established last year by Dr. Victor Mucino of WVU MAE, and to date no students are enrolled in the program.*

MSAE students at UNAQ will earn two MSAE degrees, spending approximately 1.5 years at each university, and taking distance education courses at each university over the ~3-year time period.

Mexican CONACyT agency will select and fully fund qualified Mexican engineering students while they study at WVU to complete their MS degrees, and will also fund WVU students who study in Mexico.

Current MAE Assessment of Global Learning Programs

- *The MAE assessment to date of our global learning programs consists of anecdotal input from interviews of program participants.*
- *While at UTV spring 2015, I got evaluations of the program from all WVU participants. All responses were quite positive, but with some specific requests for improvements. (Help in getting "settled in" in Rome when they arrived; some help in getting courses approved for transfer credit quickly enough to meet prerequisites for next semester courses at WVU in the fall)*
- *Prior to going to UTV, I met with one 2014 student participant who worked in International Programs Office who gave me additional insight into the problems faced in getting courses approved for transfer credit.*
- *While at UTV I presented a seminar to their 3rd year students and some graduate students, with information about the MAE Department and our research focus areas.*
- *During the fall 2016 semester, I worked with 4-5 of the 2015 students to give 2 recruitment talks to MAE students, and run a information table at a recruitment fair for all Engineering College freshman students.*
- *During the 2015-2016 academic year, I met with 4 of the 2015 students and/or exchanged emails to ask these students how well-prepared that they felt they were for their senior year courses in the subject matter from the UTV courses. All students responded that they felt very well-prepared.*
- *Also in 2015/16 I led work to get the table of course equivalencies vetted by the ME and AE Undergraduate Curriculum Committees, and got the approved information added to the current 2016/17 WVU catalog.*

We Need Improvements in Global Learning Assessment

- *The MAE assessment to date of our global learning programs consists of interview responses from participants.*
- *We need to find ways to improve this program assessment.*
- *What are the current best practices for assessment of global learning program outcomes?*
- *Are there any objective or quantitative program assessment methods or tools?*
- *At another level, what are the current best practices for delivery methods and/or program structure and content itself? (What "works" the best in terms of positive, beneficial student outcomes?)*

Additional STEM or STEAM'D Programs at WVU

- Ceramics in China: *5.5-week program in Imperial Porcelain City of Jingdezhen, China, led by Dr. Shoji Sataka of WVU Art and Design Program (Ceramics).*
*See link at:*http://artanddesign.wvu.edu/field-study/international-programs/ceramics-in-china.

Students work with artists at the Pottery Workshop Jingdezhen, and then travel ~5Kmiles to visit important historical Chinese pottery sites. (6 Ceramics hrs.; $7.3K cost to student)



Additional STEM or STEAM'D Programs at WVU

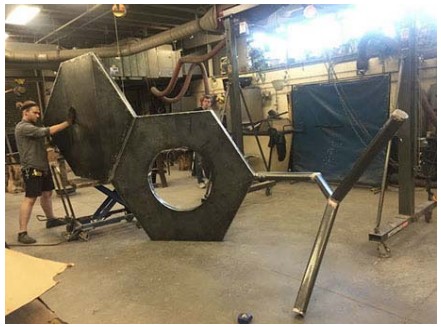
•3-D Printed Cast Bronze Reliquary Assignment: *Taught by Dr. Dylan Collins of WVU Art and Design Program (Sculpture).*
See link at: https://dylancollinsart.com/2016/02/16/3d-printed-cast-bronze-reliquary-assignment/
(3 Sculpture hrs. as part of a regular class.) (This program is STEAM'D, but not study-abroad/Global Learning.)

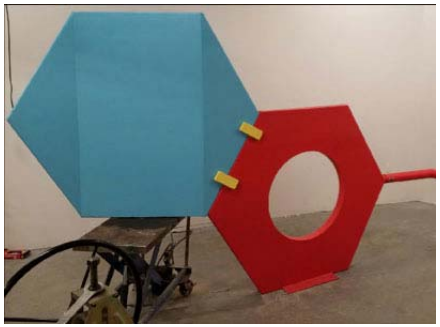
Additional STEM or STEAM'D Programs at WVU

- Community Engagement in Science Through Art (CESTA): *4-week student in Morgantown, WV, developed by WVU faculty Dr. Jessica Hoover (Chemistry), Dr. Jason Lee (Sculpture), and Dr. Todd Hamrick (Engineering) in 2016.*

See link at: http://cestaprogram.com/

Student team develops concept & fabricates welded steel structure aimed to engage public in a science concept. They earn $2K in this 4-week "residency" environment (and gain invaluable professional experience) instead of earning college credit. (This program is STEAM'D, but not study-abroad/Global Learning.)





Additional STEM or STEAM'D Programs at WVU

•Student-Driven: *Individual WVU students also seek similar opportunities on their own. (E.g., an entering fall 2017 PhD student in the College of Education and Human Services wishing to study educational pedagogy of applying technology in Art or the Arts; or a current MAE student working in WVU "Launch Lab" as a resource person in 3-D printing, but becoming a contributor for the submission of two patents, etc.)*

•WVU MBA Program: *Requires that all students complete a (3-week minimum) international component, in either China, Germany, or the UK.*

•WVU Economics Program in Eastern Europe: *Students study in an integrated fashion the economics, the culture, and language at an eastern European country. Similar class or program experiences in College of Engineering in Germany & UK.*

•Program Outcomes: *When you ask them or observe them, the students are uniformly enthusiastic about these programs, often even saying they are "life changing". Involved faculty mentors also believe in the high value of their programs, and believe there is significant positive change in their students. (& also saying "life changing")*

•However:

a.) *Often no assessment of program outcomes is performed (workload), and*

b.) *How does one truly prove the "added value" resulted from this particular class or experience out of the 5 classes that the student is taking during that semester?*

c.) *These classes or projects all generally have small enrollments. (Limited reach)*

What Makes These Programs Successful?

- *Disclaimer: These are just my opinions or observations, based on my own experience.*
- *Programs are created and grow out of the interest and commitment of the faculty leader(s) of such programs. Therefore each program must have a "Champion" to initially create the program, and then to sustain it. (WVU-UTV: yes)*
- *Programs must be affordable to students. (WVU-UTV: yes)*
- *Programs benefit greatly if students know they will earn credits for the degrees they are seeking. (WVU-UTV: yes)*
- *Programs benefit if the study abroad is at a location that is attractive to the student. (WVU-UTV: yes)*
- *Programs benefit if courses are taught in English. (WVU-UTV: yes)*
- *Summary - Successful Programs Need: 1.) A Champion, 2.) Approved Courses in Major Field, 3.) A Good Location, 4.) Low Cost, and 5.) In English*

(I have done recruiting presentations at WVU.)

Università di Roma Tor Vergata

WVU MAE - URTV Study Abroad Program

Benjamin M. Statler College of
ENGINEERING AND MINERAL RESOURCES

FAQs – Frequently Asked Questions

- "Isn't it expensive?"
  - Direct Exchange – You will pay WVU tuition and fees, and will be able to get discounted travel through the Erasmus program.

- "Won't I fall behind in my career?"
  - Junior-level Engineering credit available (Typically, 15 to 18 credits transfer in your major back to WVU.)

- "What if I don't speak Italian?"
  - Courses are taught in English.

Requirements and Eligibility

Requirements/Prerequisites:

- Participants must have completed:
  - PHYS 111 General Physics I
  - MATH 156 Calculus 2 (with grade C or better)
  - MATH 251 Multivariable Calculus (with grade C or better)
  - MATH 261 Elementary Differential Equations (with grade C or better)
  - MAE 241 Statics
  - MAE 242 Dynamics
  - MAE 243 Mechanics of Materials

  Also:
  - ITAL 101 Elementary Italian I is very beneficial, but not required.
  - PHYS 112 General Physics II is helpful/needed, if you plan to complete an EE course at UTV.
  - **Swap Fluid Mechanics for Thermodynamics in fall semester of junior year**
- Overall GPA 3.0 or better in MAE courses (major GPA)

Courses and Topics Available

Università di Roma Tor Vergata	West Virginia University	
• Thermodynamics & Heat Transfer	• MAE 320 Thermodynamics, and • MAE 423 Heat Transfer	3 hrs 3 hrs
• Machine Design	• MAE 343 Intermediate Mechanics of Materials, and • MAE 454 Machine Design/Manufacturing	3 hrs 3 hrs
• Manufacturing Technologies	• IENG 302 Manufacturing Processes	2 hrs
• Energy Systems	• MAE 321 Applied Thermodynamics	3 hrs
		Total: 17 hrs
	• and several others, including MAE 460	

People


Iceland
Sweden
Finland
Norway
Russia
Estonia
Latvia
Lithuania
Belarus
Kazakhstan
Ireland
United Kingdom
Poland
Germany
Ukraine
Luxembourg
Czech Republic
Slovakia
Austria
Hungary
Romania
Georgia
Azerbaijan
Armenia
Portugal
Spain
Andorra
Monaco
San Marino
Italy
Vatican City
Serbia
Bulgaria
Turkey
Iran
Greece
Syria
Iraq
Cyprus
Jordan
Saudi Arabia
Morocco
Algeria
Tunisia
Malta

Food

Pasta… Pizza… Gelato…

Travel

Endless Opportunities…

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