

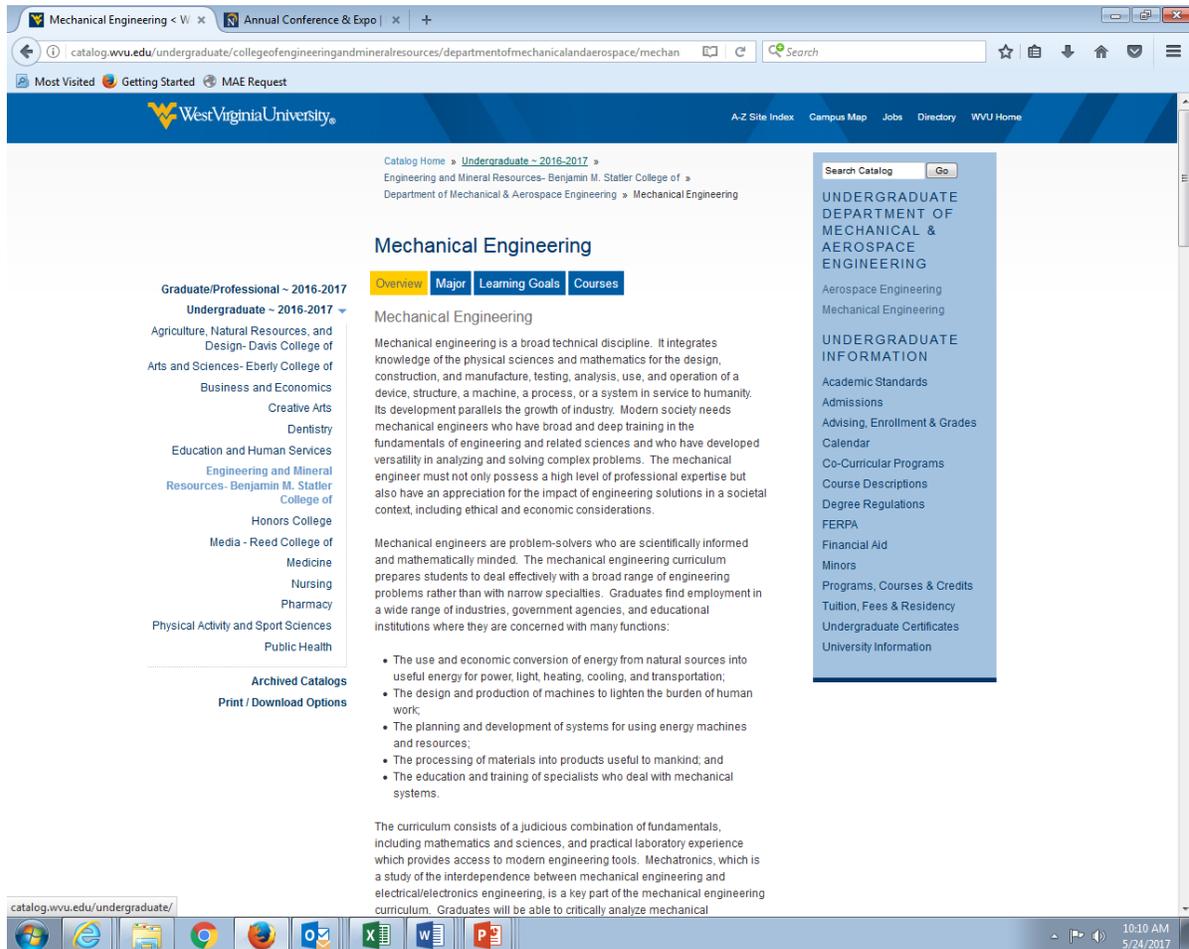
WVU MAE Global Learning Programs

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1. Introduction and Brief Background

- *I will describe the study abroad / Global Learning programs in my MAE Department, with a 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 (in Compressible Aerodynamics) at UTV for 6 weeks at that same time.*
- *The WVU-UTV study abroad exchange program was established in 2000 by Drs. Mirdul Gautam, Ever Barbero, and Victor Mucino, of the WVU MAE Dept. and Drs. Stefano Cordiner, Roberto Verzico, and Vincenzo Mulone of UTV.*
- *UTV established a 3-year BS degree program in Engineering Science to be taught fully in English by the UTV faculty – helps their students, too, for employment in other EU countries.*
- *The first WVU students went to UTV in spring term of 2013, after UTV had established all courses for the 3-year program.*
- *The exchange is fulfilled by UTV sending selected 4th-year (beginning MS) UTV students, or PhD students, to MAE each fall semester. (very high-quality students)*
- *I feel that this program is successful, in part, because of efforts to get the course equivalencies approved by the MAE faculty. Then WVU students know for certain 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!)*

2. WVU MAE Study Abroad Program at UTV is Fully Described in Current WVU Catalog



The following information appears in our MAE Department catalog material (shown above) when you scroll down:

All MAE undergraduates are invited to consider spending the spring semester of their junior year studying abroad at the University of Rome Tor Vergata (“UTV”, for short). This very successful program is taught fully in English at UTV to both Italian undergraduate engineering students and students from other countries all over the world. Through this program WVU students have the opportunity to earn credits towards their WVU BSME or dual BSME/BSAE degrees for a full semester of equivalent WVU engineering courses towards their degrees. Please see the following link for the UTV description of this program:

<http://engineering-sciences.uniroma2.it/MENU/COURSES/Courses.html>

In order to ensure that, upon successfully passing the UTV class examinations, the credits earned at UTV will transfer back to WVU for the equivalent courses within the MAE degree programs, it is recommended that students should select from the following list of UTV courses only those courses that are regularly taught during their spring semester:

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				

UTV also strongly recommends that WVU students register for Italian Language Class for Foreigners 2.

Additional courses taught during the UTV fall semester as listed above can also be completed by students who participate in this WVU-UTV student exchange program for their full junior year: e.g., Kinematics and Dynamics of Mechanisms (for WVU courses MAE 342 & MAE 495), Electrical Network Analysis (for WVU course EE 221), and Fluid Machinery (for WVU course MAE 495).

The UTV spring semester classes begin each year in mid-February, with classes ending near the end of June. Examinations are then given during the month of July. WVU students who participate in the WVU-UTV exchange program must pay their normal WVU tuition and fees for their study abroad semester, and are also responsible to cover all of their travel and living expenses while participating in the program. You must complete your transient form (studyabroad.wvu.edu) before your semester abroad. Check with your advisor before registering for courses to approve your course choices. This program is also part of the WVU Statler program to earn the Certificate of Global Competency; see the MAE Department program description in the current WVU Catalog for additional details of this Certificate Program.

3. Course Equivalencies

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

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UTV Course Title:	US Credits:	WVU Course:	WVU Course Title:	Credit Hours:
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		MAE 423	Heat Transfer	3
Energy Systems	4	MAE 321	Applied Thermodynamics	3
Machine Design	6	MAE 343	Intermediate Mechanics of Materials, and:	3
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Analog Electronics	6	MAE 495	Indepndnt Study: Analog Electronics	3
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Kinematics & Dynamics of Mechanisms*	6	MAE 342	Dynamics of Machines, and :	3
		MAE 495	Indepndnt Study: Adv. Kinematics of Machns.	3
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- *Students typically can transfer back 15-18 junior-senior level MAE 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. In 2015-2016 both the MAE Mechanical Engineering and Aerospace Engineering Undergraduate Curriculum Committees approved the above table of course equivalencies. (We also worked with the IE and EE course instructors to get their input for the UTV courses in Manufacturing Technologies, Electrical Network Analysis, and Analog Electronics.)*

4. Additional STEM Global Learning Programs in MAE

- 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; see link at: <http://industrialoutreachmexico.wvu.edu>. Mexican MSME students also spend a semester studying at WVU each year as a part of this program. (WVU students earn 6 MAE hrs. (senior capstone +and MAE Technical Elective, and 3 General Ed. hrs., with a ~\$7-8K cost to student.)
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.
- 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 Technical Elective credits, with a ~\$3.5K cost to student.)
- 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.

5. Current MAE Assessment of Global Learning Programs

- *The MAE assessment to date of our global learning programs consists of anecdotal input from interviews of students.*
- *While at UTV in spring 2015, I met twice with all 7 WVU students there to get their evaluation of the program: generally quite positive, but with some specific requests for improvements. (Some 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)*
- *I met with one student participant from 2014 who worked in WVU 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 or 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 four 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.*

6. We Need Improvements in Global Learning Assessment

- *The MAE assessment to date of our global learning programs consists of interview responses from student participants. This can be time-intensive to gather this information. (What is I am too busy or forget? What is I retire?)*
- *We feel that we need to find ways to improve this program assessment. Could it be institutionalized in some way?*
- *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?)*

7. Additional STEM or STEAM'D Programs at WVU

- Community Engagement in Science Through Art (CESTA): 4-week student project 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/> The student team develops concept for & fabricates a welded steel sculpture aimed to engage public in a science concept. Students earn \$2K through 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.)
- 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> See also: <https://www.youtube.com/watch?v=Bz0XkcV7XIM> Students work with artists at the Pottery Workshop Jingdezhen, and then travel ~ 5K miles to visit several important historical Chinese pottery sites. (6 Ceramics hrs.; \$7.3K cost to student)
- 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.)

7. (Continued) Additional STEM or STEAM'D Programs at WVU

- Student-Driven: *Individual WVU students also seek similar opportunities on their own. (E.g., a new 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 hourly 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 (Munich – past 3 years) & UK (This fall).*
- Program Outcomes: *When you ask them or observe them, the students in all programs 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. (Again, “life changing”)*
- However:
 - a.) *Often no assessment of program outcomes is performed. (workload too high; not trained to do assessment)*
 - b.) *How to 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; how to replicate on a larger scale)*

8. What Makes These Programs Successful?

- *Disclaimer: These are just my opinions or observations, based on my own experience.*
- *These 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, if possible*
 - 5.) *In English (This seems to me to perhaps be a reasonable goal to try to achieve in Europe or India, for example.)*