

Transatlantic Academic Programs in Mechanical Engineering: The TU Darmstadt and Virginia Tech bilateral senior year abroad and dual-MS degree programs

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[**http://www.tud.vt.edu/BS/**](http://www.tud.vt.edu/BS/)

[**http://www.tud.vt.edu/MS/**](http://www.tud.vt.edu/MS/)

Outline

- TUD - VT compatibility
- Partnership vision
- BSME senior year abroad
- Dual MSME degree program
- NSF REU program

Compatibility

TU Darmstadt

- State university
 - Autonomous
- Comprehensive
 - Not all engineering/science
- 220 BSME graduates/year
- Ranked top 1-3 (Germany)
- Focus on research
- PACE partner (automotive)
- Bologna process

Virginia Tech

- State university
 - Restructuring
- Comprehensive
 - Not all engineering/science
- 275 BSME graduates/year
- Ranked top 5-6% (USA)
- Focus on research
- PACE partner (automotive)

Vision

An environment that fully supports global collaborative engineering

- Study abroad programs
- Dual and joint degree programs
- Global student design projects
- Multi-national industry internships
- Global research projects
- Faculty and student exchange programs

Bilateral BSME Senior Year

Prerequisites

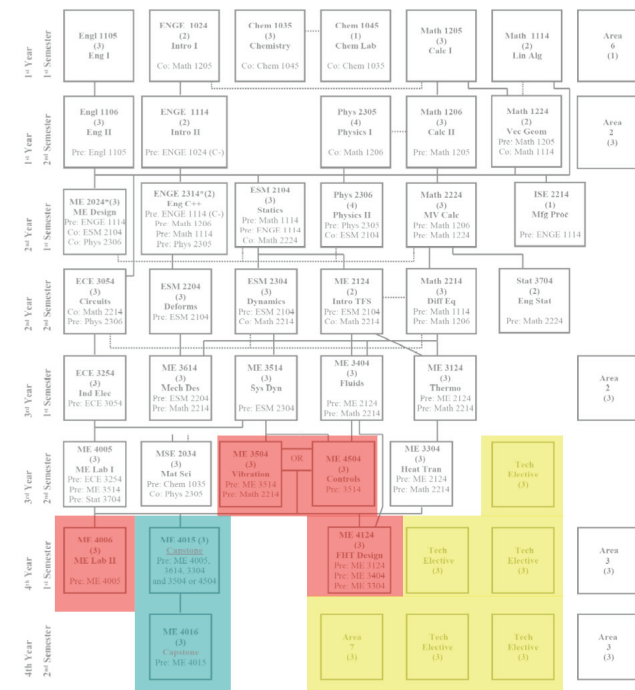
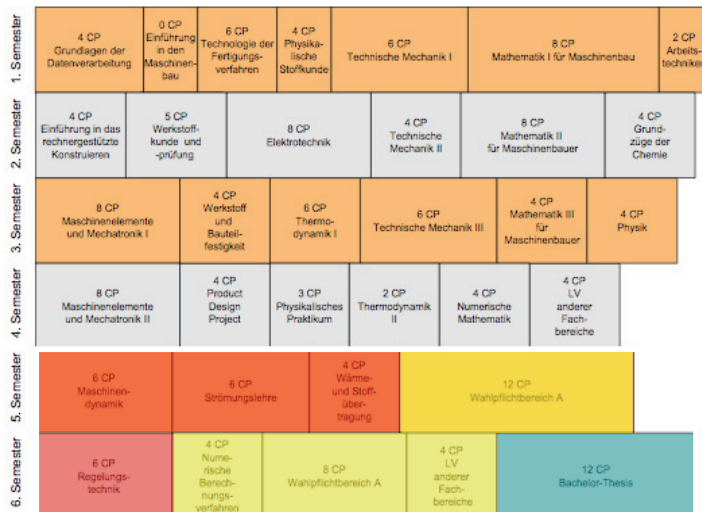
- Do not affect accreditation
- Transfer 100% of credits earned abroad
- Do not delay graduation
- Full immersion
- Facilitate language training if needed
- Minimize course sequence reorganization

Bilateral BSME Senior Year

Sophomore and Junior years contain the core engineering program, reflecting its “signature” (i.e., not easy to transfer credits)

Maschinenbau - Mechanical and Process Engineering

Das Bachelorstudium „Maschinenbau - Mechanical and Process Engineering“ umfasst 6 Semester. Als Abschluss wird der Bachelor of Science verliehen. Das Studienprogramm wird durch die nachstehende Grafik illustriert.



Bilateral BSME Senior Year

German language training

- 2.5% of US high school students study German
- UNiCert level III
 - Lectures in German; exams in German (written)
 - 18 semester credit hours (36 CP) German language
 - Typically completed over 3 years
 - 3 six-week semesters between May 20 and October 1
- Default is to complete 1.5 summers
 - Often reduced by advanced placement (AP) credits

Dual MSME Degree Program

Prerequisites

- Two degrees
 - Satisfy both universities' requirements
- Two-year program
 - One year at each university, fully symmetric
- Transfer 100% of credits earned abroad
- Full immersion
- Open to students with BSME from elsewhere
- Prepare for doctoral studies

Dual MSME Degree Program

Virginia Tech $\Rightarrow$ TU Darmstadt (116 CP, 58 credits)

Fall semester (Virginia Tech) Aug 15 - Dec 15 (24 CP, 12 credits)

- ISE 5174 Engineering Program & Project Management 6 CP, 3 credits
- Laboratory intensive elective 6 CP, 3 credits
- Introductory technical elective 6 CP, 3 credits
- Applied engineering elective 6 CP, 3 credits

Spring semester (Virginia Tech) Jan 15 - May 15 (30 CP, 15 credits)

- Mathematics and statistics elective I, II 12 CP, 6 credits
- Theory and methodology elective I, II 12 CP, 6 credits
- Applied engineering elective 6 CP, 3 credits

Internship (6+ weeks full-time) May 15 - Oct 1

Winter semester (TU Darmstadt) Oct 1 - Mar 31 (28 CP, 14 credits)

- Advanced design project 4 CP, 2 credits
- Mathematics and statistics elective 10 CP, 5 credits
- Non-engineering free elective 4 CP, 2 credits
- Theory and methodology elective 10 CP, 5 credits

Summer semester (TU Darmstadt) Apr 1 - Sep 30 (34 CP, 17 credits)

- Master-Thesis 6 months upper limit

Alternative 1

Dual MSME Degree Program

TU Darmstadt $\Rightarrow$ Virginia Tech (116 CP, 58 credits)

Winter semester (TU Darmstadt) Oct 1 - Mar 31 (26 CP, 13 credits)

- Projectmanagement 2 CP, 1 credits
- Maschinenbaututorium / Electrotechnikpraktikum 4 CP, 2 credits
- Introductory technical elective 8 CP, 4 credits
- Applied engineering elective 12 CP, 6 credits

Summer semester (TU Darmstadt) Apr 1 - Aug 1 (28 CP, 14 credits)

- Mathematics and statistics electives 12 CP, 6 credits
- Theory and methodology electives 8 CP, 4 credits
- Non-engineering free electives 8 CP, 4 credits

Fall semester (Virginia Tech) Aug 15 - Dec 15 (28 CP, 14 credits)

- ME 5974 Independent Study (advanced design project) 4 CP, 2 credits
- Mathematics and statistics electives I, II 12 CP, 6 credits
- Theory and methodology electives I, II 12 CP, 6 credits
- **240+ hours industry internship / university research**

Spring semester (Virginia Tech) Jan 1 - Jun 30 (34 CP, 17 credits)

- ME 5994 Research & Thesis 6 months upper limit

Alternative 2

Dual MSME Degree Program

German language training

- UNlcert level II
 - Lectures in German; exams in English (oral)
 - 12 semester credit hours (24 CP) German language
 - Typically completed over 2 years
 - 2 six-week semesters between May 20 and August 10
 - Time for additional training if needed (Aug 20 - Oct 1)

NSF REU program

- Research Experience for Undergraduates
 - Inspire students to pursue graduate studies
 - e.g., Dual MSME degree program
- Automotive technologies
- 10 weeks summer research at Virginia Tech or at TU Darmstadt (2007, 2008, 2009)
- Salary, housing, food, travel
- NSF: Open to US citizens and residents
- **Expand to include German students?**

Summary

- Virginia Tech and TU Darmstadt have developed and is continuing to develop a comprehensive partnership
 - Summer school and summer research
 - BSME, MSME, doctorate programs
 - Joint research centers and courses
- Expanding to include English, German, Architecture, Urban Planning, and other engineering and science programs
- Focus of depth and quality facilitates resource leveraging, attracts external support, and opens new opportunities
- Need financial support for German language training
 - NSF REU model: { salary, housing, food, travel } to compete with summer internships

Need for dual / joint BSME ?

OBSERVATIONS:

- Only the most academically and socially mature students will attend the BSME senior year abroad (only top 64% are eligible)
- Most of these students will continue with graduate studies (e.g., dual MSME, joint doctorate)

CONCLUSION:

- No need for dual or joint BSME degree because these students will have a **diploma** and a **transcript** from both Virginia Tech and TU Darmstadt