The Virginia Tech Senior Year in Mechanical Engineering at the Technische Universität Darmstadt, Germany

VT-TUD Dual BSME Degree Program

Summary
Based on the Memorandum of Understanding (MOU) and the Implementation Agreement (IA) on student exchanges in effect between Virginia Tech and the Technische Universität Darmstadt, Germany, students in Mechanical Engineering at Virginia Tech can complete their senior year towards their Virginia Tech Bachelor of Science in Mechanical Engineering at the Technische Universität Darmstadt in Germany. Additionally, students in this program have the opportunity, through appropriate course selection, to also earn a Bachelor of Science degree in the field of Mechanical and Process Engineering from the Technische Universität Darmstadt, Germany. This option is referred to as the VT-TUD Dual BSME Degree Program. This document details the application process, student eligibility criteria, and curricular issues.

This document can be found online at http://www.tud.vt.edu/BS/VTBSME@TUD.pdf

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1.0 Overview

Based on the Memorandum of Understanding (MOU) and the Implementation Agreement (IA) on student exchanges in effect between Virginia Tech and the Technische Universität Darmstadt, Germany, students in Mechanical Engineering at Virginia Tech can complete their senior year towards their Virginia Tech Bachelor of Science in Mechanical Engineering (BSME) at the Technische Universität Darmstadt in Germany.

Additionally, students in this program have the opportunity, through appropriate course selection, to also earn a Bachelor of Science degree in the field of Mechanical and Process Engineering (B.Sc. (MPE)) from the Technische Universität Darmstadt, Germany. This option is referred to as the VT-TUD Dual BSME Degree Program.

Virginia Tech students interested in participating in this student exchange program must demonstrate proficiency in the German language prior to attending engineering courses at the Technische Universität Darmstadt, because these courses are taught in German. Together, Virginia Tech and Technische Universität Darmstadt offer several sequences of German language courses to enable students, even with no prior German language experience, to attain this proficiency. In addition, Technische Universität Darmstadt offers additional German language courses during the student’s senior year to help further polish these language skills. Hence, the student must plan ahead: For a student with no prior German language skills, the German language course sequence must commence no later than their Virginia Tech BSME junior year Spring semester, with a preferred start prior to the junior year to maximize the amount of German language training prior to departing for Germany.

Studying engineering abroad in a foreign language is not trivial. Especially in the beginning, it will be a seriously taxing experience. To reduce the strain of this challenge, students are strongly encouraged to start learning German as soon as possible and to exceed the minimum German language preparation; for instance, by pursuing a Virginia Tech minor in German. Students are also encouraged to complete at least 12 weeks of industry internship prior to their senior year at the Technische Universität Darmstadt, to help put their theoretical engineering coursework thus far into context, and thereby creating a more robust foundation for excelling in subsequent engineering coursework. However, neither a German minor nor industry internship are required for successful participation.

Virginia Tech students interested in participating in this student exchange program must demonstrate academic excellence and stability, and personal maturity. This includes having a Virginia Tech overall GPA of 3.0 or better, and having earned a “C” or better in all engineering (ECE, ENGE, ESM, ISE, ME, MSE) and natural science (CHEM, MATH, PHYS, STAT) courses.

For students that are not already sufficiently proficient in German, it also includes having earned a “B+” or better in GER 2106 or GER 2114, or a “B” or better in GER 3106, prior to departing for Technische Universität Darmstadt to complete their remaining German language training and subsequent engineering courses.
The courses taken at Technische Universität Darmstadt will be counted as transfer credits and will therefore not count towards the student’s Virginia Tech grade point average (GPA) at graduation. The students will receive a separate transcript from Technische Universität Darmstadt to document their academic performance at that university.

Finally, the Technische Universität Darmstadt academic year runs from mid-October through mid-August. Students that complete their courses on track in this student exchange program will therefore have to delay their Virginia Tech BSME graduation three months to become August-graduates instead. Virginia Tech permits students that are on track for August-graduation to participate in the May graduation exercises in Blacksburg. Furthermore, this delay should not impact a student’s ability to enter graduate school in the fall semester of that year (e.g., the Virginia Tech Graduate School validates completion of the undergraduate degrees in November). It will, however, necessarily delay this student’s ability to join the workforce relative to the original May graduation date.

2.0 Application process and financial aid

Admission to this student exchange program is by application only and is on a competitive basis. There is a two-stage application process: For the first stage, the application deadline is at 5:00PM EST on the second Friday of the Spring semester of the junior year to the Virginia Tech Department of Mechanical Engineering. The application form is available on the Department of Mechanical Engineering web site or at [http://www.tud.vt.edu/BS](http://www.tud.vt.edu/BS).

Only those students who can demonstrate German language proficiency (or a plan on how to attain it prior to commencing engineering courses at Technische Universität Darmstadt), that are academically on schedule, and that have attained acceptable grades, will be considered (see Section 2.1). The Virginia Tech Department of Mechanical Engineering will select from this pool of applicants the candidates that it will nominate to the Virginia Tech Global Education Office.

The Virginia Tech Department of Mechanical Engineering, with the assistance from the Virginia Tech Department of Foreign Languages and Literatures, conducts written assessments of the German language proficiency of the nominated students and subsequently issues recommendations for the students’ participation in either (A) the VT-TUD Dual BSME Degree Program option, or (B) the regular VT BSME Senior Year at Technische Universität Darmstadt.

In the second stage of the application process, the Virginia Tech Global Education Office will work with the nominated students to complete their formal application materials for Technische Universität Darmstadt and any remaining Virginia Tech documents that must be completed prior to departing for Germany. The Virginia Tech Global Education Office will then forward the students’ applications to the Technische Universität Darmstadt, whereupon the Technische Universität Darmstadt will make the final selection of whom it will admit.

The Implementation Agreement (IA) on student exchanges between Virginia Tech and Technische Universität Darmstadt governs the number of students to be exchanged. This number may vary from year to year.
2.1 Nomination criteria

Only Virginia Tech undergraduate mechanical engineering students that satisfy the following criteria will be considered:

1. The student has applied for Virginia Tech BSME graduation, and the application is current (https://www.registrar.vt.edu/graduation/undergraduate/degree/index.html);

2. Virginia Tech overall GPA $\geq 3.0$;

3. Virginia Tech transcript shows a grade of “C” or better in all engineering (ECE, ENGE, ESM, ISE, ME, MSE) and natural science (CHEM, MATH, PHYS, STAT) courses;

4. Virginia Tech transcript shows a grade of “C” or better in at least six semester credit hours of AREA 2, AREA 3, and/or AREA 7 course work;

5. The student is on schedule to complete all of the following courses (or their approved substitutes) prior to commencing the Technische Universität Darmstadt Winter semester:

   - CHEM 1035 General Chemistry
   - CHEM 1045 General Chemistry Laboratory
   - ECE 2054 Applied Electrical Theory
   - ECE 3254 Industrial Electronics
   - ENGE 1215 Foundations of Engineering I
   - ENGE 1216 Foundations of Engineering II
   - Programming Course: ME 2004, ENGE 2514, CS 1044, CS 1054, CS 1114, CS 1124, ECE 1574, ESM 2074, or AP credit for CS 1705
   - ENGL 1105 Freshman English I
   - ENGL 1106 Freshman English II
   - ESM 2104 Statics
   - ESM 2204 Mechanics of Deformable Bodies
   - ESM 2304 Dynamics
   - ISE 2214 Manufacturing Processes Laboratory
   - MATH 1225 Calculus I
   - MATH 1226 Calculus II
   - MATH 2114 Linear Algebra
   - MATH 2214 Introduction to Differential Equations
   - MATH 2224 Multivariable Calculus
   - ME 2024 Introduction to Engineering Design & Economics
   - ME 2124 Introduction to Thermal & Fluid Engineering
   - ME 3124 Thermodynamics
   - ME 3304 Heat & Mass Transfer
   - ME 3404 Fluid Mechanics
   - ME 3514 System Dynamics
   - ME 3614 Mechanical Design I
   - ME 4005 Mechanical Engineering Laboratory I
   - MSE 2034 Elements of Materials Engineering
6. The student is on schedule to complete all required AREA 2/3/7 electives — with the exception of at most three semester credit hours — prior to commencing the Technische Universität Darmstadt Winter semester;

7. The student has completed, or is on schedule to complete, all the required German language courses with satisfactory grades as described in Section 3; and

8. The student is \textbf{not} scheduled to complete any the following courses prior to commencing the Technische Universität Darmstadt Winter semester:

- ME 4006 Mechanical Engineering Lab II
- ME 4015 Engineering Design & Project I
- ME 4016 Engineering Design & Project II
- ME 4124 Fluid Machinery - Heat Transfer Design
- ME 4504 Dynamic Systems - Controls Engineering I

\textbf{2.2 Program costs and financial aid}

An important objective of this student exchange program is to remain as close to cost-neutral as possible. The basic principle is that the participating students pay their home-university’s tuition and comprehensive fees while abroad, and then exchange seats with a student from the host university. Hence, the Virginia Tech student will be required to pay Virginia Tech tuition and comprehensive fees during the senior year at Technische Universität Darmstadt, but will not pay such expenses to Technische Universität Darmstadt.

Participating Virginia Tech students attending the Technische Universität Darmstadt Winter- and Summer-semesters their senior year, including the “intensive phase” German language course during September-October, will pay Virginia Tech tuition and fees (full-time status) during the Virginia Tech Fall- and Spring-semesters during that year.

\textbf{Exception:} Students that attend the intensive German language course (the “bridge course”) at the Technische Universität Darmstadt during the Virginia Tech Summer II Session prior to their senior year will also pay for Virginia Tech tuition and fees (full-time status) during that session.

Participating students should realize that Virginia Tech and Technische Universität Darmstadt do not have exactly matching fee structures, and hence the students will effectively pay for certain related services multiple times. For instance, while many Virginia Tech students are covered by their family’s medical insurance, both Virginia Tech and Technische Universität Darmstadt will require the students to purchase additional medical insurances for their combined complete required coverage. Likewise, Virginia Tech students will pay for a public transportation fee both in Blacksburg and in Darmstadt while at Technische Universität Darmstadt. The Virginia Tech Global Education Office can provide details on these overlapping fees, and other fees that that office charges for their education abroad support services.
Students will be responsible for their own cost of living and travel. Students report that the cost of living in Blacksburg and Darmstadt are similar. The cost of housing is slightly more expensive in Darmstadt, while the cost of food is slightly more expensive in Blacksburg. The transportation fee charged by Technische Universität Darmstadt covers public transportation in and around Darmstadt, and few, if any, Virginia Tech students see a need to purchase an automotive vehicle while in Germany.

The estimated overall cost of completing the VT BSME senior year in Darmstadt is approximately $4,000 more than in Blacksburg (September through August). This estimate includes two round-trip airline tickets.

Students that cannot complete their German language training during their regular semesters in Blacksburg should add the costs of any additional Virginia Tech summer sessions needed.

An important benefit of paying Virginia Tech tuition and fees while in Darmstadt is that one’s Virginia Tech financial aid carries over to Darmstadt. Furthermore, since one’s estimated financial need increases slightly while in Darmstadt, the financial aid awarded may be increased; and, in some cases, it may even commence for students that otherwise would not be eligible for financial aid had they remained in Blacksburg. The Virginia Tech Global Education Office will assist students in working with Virginia Tech Financial Aid to update their financial aid package.

Participating students are encouraged to apply for scholarships, grants, and stipends to support their Virginia Tech BSME senior year at Technische Universität Darmstadt. An important source is the DAAD Undergraduate Scholarships. The deadline is typically January 31 for the following academic year in Germany. For the 2016-2017 academic year, these scholarships consist of €6,500 (approximately US$7,335) plus additional funds towards travel and health insurance. These are competitive scholarships, and recipients often have a GPA above 3.7: [http://www.daad.org/undergrad](http://www.daad.org/undergrad)

### 3.0 German language prerequisites prior to senior year

The language of instruction at the Technische Universität Darmstadt is German. However, unlike regularly admitted students, exchange students at the Technische Universität Darmstadt are not required to know any German. Rather, it is the purview of a student’s academic host department to set the level of German language skills that is required. In the case of the Virginia Tech BSME students, this is the Faculty of Mechanical Engineering at the Technische Universität Darmstadt: At present they have not set a minimum German language skills entrance requirement for undergraduate exchange students, including for VT BSME students.

The standard level of German language skills expected by exchange students in dual degree programs at Technische Universität Darmstadt is at least at the CEFR Levels A2 (written) and B1 (oral) by the start of the Winter-semester in mid-October:

**LEVEL A2:** Can understand sentences and frequently used expressions related to areas of most immediate relevance (e.g., very basic personal and family information, shopping, local geography, employment). Can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. Can describe
in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need.

http://www.tu-darmstadt.de/international/exchangestudents/inbound/europe_inbound/before_1/language_2/language.en.jsp

The Common European Framework of Reference for Languages (CEFR) Level A2 can be achieved in about 9 semester credit hours (approximately 135 lecture hours) of university level German. To put this in context, Purdue University Mechanical Engineering and Virginia Tech Industrial and Systems Engineering send their students to Karlsruhe Institute of Technology with 12 semester credit hours of German (approximately 180 lecture hours), while the University of Rhode Island sends its engineering students to Technische Universität Braunschweig with 18 semester credit hours of German (approximately 270 lecture hours).

The A2 level is generally sufficient for you to cope with the language in everyday life. The B1 level will enable you to communicate within the university, and the B2 level will enable you to follow lectures and seminars in German.

**LEVEL B1:** Can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Can deal with most situations likely to arise while travelling in an area where the language is spoken. Can produce simple connected text on topics that are familiar or of personal interest. Can describe experiences and events, dreams, hopes and ambitions and briefly give reasons and explanations for opinions and plans.

**LEVEL B2:** Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialization. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.

**Virginia Tech Mechanical Engineering students enter the Technische Universität Darmstadt engineering classrooms with 345 lecture hours of German language instruction (not counting an additional 690 hours of out-of-class work), which corresponds to an excess of 21 semester credit hours.**

The objective of this increased amount of German language instruction is for the Virginia Tech BSME students to attain sufficient proficiency in the German language for them to competently follow classroom instruction, with the majority of the students attaining the B2 level (UNcert level II) by the time they enter the German engineering classroom in mid-October. This is achieved by completing at least three years of university-level German coursework, followed by a five-week intensive German language course (“intensive phase”) at the Technische Universität Darmstadt just prior to the start of their Winter-semester:
High School:
Students who have studied German in high school should consult the Virginia Tech Foreign Language Placement Guidelines: https://www.fll.vt.edu/forms/fll-placement-2015.pdf

Typically, students with three or more years of high school German will begin their study of German at Virginia Tech at the intermediate (2000) level—if students took German their senior year in high school.

First Year:
• GER 1105 (3 semester credit hours, VT Fall Semester) and GER 1106 (3 semester credit hours, VT Spring Semester); or
• GER 1114 (6 semester credit hours, VT Spring Semester).

Second Year:
• GER 2105 (3 semester credit hours, VT Fall Semester) and GER 2106 (3 semester credit hours, VT Spring Semester); or
• GER 2114 (6 semester credit hours, VT Summer I Session).

Third Year:
• GER 3105 (3 semester credit hours, VT Fall Semester) and GER 3106 (3 semester credit hours, VT Spring Semester); or
• “Bridge” course (6 semester credit hours, VT Summer II Session, in Darmstadt) with emphasis on “Engineering German” and not necessarily duplicating 3105-3106.

Intensive Phase:
• Five-week course (September-October, in Darmstadt)

Minimum Grades: As interim measures of success, the participating Virginia Tech BSME students must earn “B+” or better in GER 2106 or GER 2114, or a “B” or better in GER 3106, prior to departing for Technische Universität Darmstadt to complete their remaining German language training and subsequent engineering courses.

Gaps in German Language Training: The German program of the Virginia Tech Department of Foreign Languages and Literatures strongly advises that students not have a gap of more than one semester once they commence learning German. Hence, a gap of two semesters or more should be avoided when planning one’s German language course sequence. Students who learned German in high school are strongly encouraged to begin their study of the language during their freshman year at Virginia Tech.

Continuing Education: While attending engineering lectures during the Technische Universität Darmstadt Winter- and Summer-semesters (mid-October through mid-July), the participating students are expected to audit or take for a grade a German language course every semester. Experience at the Technische Universität Darmstadt has shown that continuing formal German language training during the academic year significantly improves the student’s ability to follow classroom instruction, and hence significantly increases the likelihood of on-time graduation.
**German Minor:** The Virginia Tech German Minor requires two courses beyond the GER 3105-3106 sequence. In order to complete the minor, students beginning their study of German with GER 1105 (or 1114) would take a total of 24 semester credit hours of German language training prior to the “Intensive Phase” course at Technische Universität Darmstadt. Participating students are encouraged to complete the minor prior to departing for Germany if their schedule permits. The following is a sample plan of study based on the Virginia Tech 2015-2016 course offerings:

- **Freshman year:** GER 1105-1106 (Fall-Spring) or GER 1114 (Spring); GER 2114 (Summer I)
- **Sophomore year:** GER 3105 (Fall), GER 3106 (Spring)  
  *Summer internship in the USA (no credit)*
- **Junior year:** GER 3204 (Fall), GER 3306 (Spring)  
  *Summer internship in Germany (no credit)*

Interested students should contact the German program of the Virginia Tech Department of Foreign Languages and Literatures for details concerning the minor and course availability.

Note that GER 3306 counts as an AREA 2 course.

**Bridge Course and Intensive Phase Course:** Students may also use the “Bridge” course during the VT Summer II session at Technische Universität Darmstadt in Germany towards their Virginia Tech German minor. The “Bridge” course consists of three modules in parallel: 6 CP ECTS daily intensive German language course, 3 CP ECTS project work, and 3 CP ECTS autonomous language learning course. These course credits transfer as follows:

- The 6 CP ECTS daily intensive German language course work transfers as GER 3105.
- The 3 CP ECTS project work and 3 CP ECTS autonomous language learning course work combine to transfer as GER 3XXX Elective / Special Topic, or GER 3126 Oral Proficiency.
  - Students who wish to earn GER 3XXX credit will need to submit a project paper in German to Virginia Tech Foreign Languages and Literatures for evaluation; and it is anticipated that the report for the project work will serve this purpose.
  - Students who wish to earn GER 3126 credit will need to be tested by Prof. Stefanie Hofer at Virginia Tech Foreign Languages and Literatures: If an adequate level of proficiency has been reached, then the credit will be awarded. This test can be conducted via Skype, WebEx, etc.

Additionally, the “Intensive Phase” course during early-Fall at TUD transfers as GER 3106.
A Virginia Tech German minor can therefore also be earned using the “Bridge” and “Intensive Phase” courses with time for an industry internship in Germany:

<table>
<thead>
<tr>
<th>Year</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sophomore</td>
<td>GER 1105-1106 (Fall-Spring) or GER 1114 (Spring); GER 2114 (Summer I)</td>
</tr>
<tr>
<td></td>
<td><strong>“Bridge” course</strong> (GER 3105; GER 3XXX or 3126)</td>
</tr>
<tr>
<td>Junior</td>
<td>GER 3204 (Fall)</td>
</tr>
<tr>
<td></td>
<td><em>Summer internship in Germany (no credit)</em></td>
</tr>
<tr>
<td>Senior</td>
<td><strong>“Intensive Phase” course</strong> (GER 3106)</td>
</tr>
<tr>
<td></td>
<td>TUD Winter Semester (engineering courses)</td>
</tr>
<tr>
<td></td>
<td>TUD Summer Semester (engineering courses)</td>
</tr>
</tbody>
</table>

**Virginia Tech German language course descriptions:**

- **GER 1105-1106 Elementary German**
  - Fundamentals of the German language with emphasis on grammar, reading, composition, and conversation. 1105: for students with no prior knowledge of the language; 1106: for students who have completed 1105 or less than three years in high school.

- **GER 2105-2106 Intermediate German**
  - Review of grammar with increasing emphasis on reading, writing, and oral communication. Pre: 1106 or 1114.

- **GER 2114 Accelerated Intermediate German**
  - Pre: 1106 or 1114.

- **GER 3105-3106 Grammar, Composition & Conversation**
  - Progressive and comprehensive review of German syntax and morphology. Practice in written and oral expression in German on a variety of topics in German culture. Pre: 2106 or 2114.

- **GER 3204 Culture of the German-Speaking Countries**
  - Study of German, Austrian, and Swiss culture and civilization from the Middle Ages to the present, including literature, art, architecture, film, and music. Pre: 3105.

- **GER 3305-3306 Survey of German Literature (AREA 2)**
  - 3305: Readings in major works of German literature from the late Middle Ages to the end of Classicism. 3306: Readings in major works of German literature from Romanticism to the end of World War II. Pre: 3105.
4.0 Changes to the standard Virginia Tech B.S. in Mechanical Engineering plan of study prior to studying in Germany

This section describes the pre-approved changes to the standard Virginia Tech Bachelor of Science in Mechanical Engineering plan of study for those students that wish to complete their senior year course requirements at Technische Universität Darmstadt instead of at Virginia Tech. This includes students that want to pursue the VT-TUD Dual BSME Degree program.

To facilitate this student exchange program between Virginia Tech and the Technische Universität Darmstadt, the Office of the Associate Dean of Engineering for Academic Affairs has waived the following two requirements:

1. Virginia Tech permits only 18 semester-hour credits to be transferred during the last 45 semester-hour credits prior to graduation.

   Virginia Tech Undergraduate Course Catalog and Academic Policies, 2002-2004
   Transfer Credits rule 7, page 41.

   Virginia Tech Undergraduate Course Catalog and Academic Policies, 2012-2013
   Third paragraph, section “Graduation Requirements and Degree Conferrals”

2. The Virginia Tech College of Engineering requires that the senior year be completed in residence at Virginia Tech.

   Virginia Tech Undergraduate Course Catalog and Academic Policies, 2002-2004
   Graduation Requirements, page 225.

   Virginia Tech Undergraduate Course Catalog and Academic Policies, 2012-2013
   Second paragraph, section “Graduation Requirements”
   http://www.undergradcatalog.registrar.vt.edu/1213/eng/index.html

Hence, the following six changes must be made to a student’s standard plan of study (see Section 4.1) prior to attending Technische Universität Darmstadt during the VT BSME senior year, including for the VT-TUD Dual BSME Degree program:

Junior year, fall semester, 18 semester credit hours:
- Take STS 2054 Engineering Cultures as an AREA 2 and AREA 7 course. This change is made because this is a good preparatory course and because it satisfies two requirements at once and creates a free elective.

Junior year, spring semester, 18 semester credit hours:
- Delay ME 4504 Controls to the senior year in Germany
- Replace the ME technical elective with GER 1114
- Take an AREA 3 elective (3 semester credit hours)
Summer after Junior year:
- Take GER 2114 during the VT Summer I Session in Blacksburg, Virginia
- Take “Bridge” German language course (6 weeks) at Technische Universität Darmstadt during the VT Summer II Session in Darmstadt, Germany

Early-Fall prior to Senior year:
- Take the “Intensive Phase” German language course (5 weeks) at Technische Universität Darmstadt during September-October in Darmstadt, Germany

ALTERNATIVE PREPARATIONS:

Students that are ahead of schedule due to, for instance, advanced placement credits, transfer credits, prior German language skills, course overloads, and/or summer courses, must take care to schedule their remaining courses such that they do not complete the engineering courses listed under Section 2.1, Item 8, prior to departing for Germany: Completing these engineering courses prior to departure for Germany will disqualify the student from being nominated for participation in this VT BSME senior year program.

Instead, students that are ahead of schedule are strongly encouraged to schedule their remaining courses such that they maximize the amount of German language training that they complete prior to departing for Germany. If possible, the students are encouraged to complete a VT German minor prior to departing for Germany.
4.1 Standard Virginia Tech BSME plan of study for senior year abroad at the Technische Universität Darmstadt

With the changes described above, the flowchart in Figure 1 depicts the standard plan of study for the Virginia Tech Bachelor of Science in Mechanical Engineering with the senior year being completed at the Technische Universität Darmstadt in Germany.

Figure 1: Standard Virginia Tech Bachelor of Science in Mechanical Engineering degree path with senior year at the Technische Universität Darmstadt.

Please note the following:

1. Up to 6 semester credit hours of GER 2105, 2106, 2114, 3105, 3106 can be counted as Virginia Tech Mechanical Engineering technical elective (list 2). See Section 7.4 for details on how to receive these technical elective credits. In Figure 1, GER 2114 occupies this count.

2. Taking STS 2054 satisfies AREA 2 and creates a free elective in place of the AREA 7 elective. This free elective can be satisfied by, for instance, GER 1105, 1106, 1114, 2105, 2106, 2114, 3105, 3106, etc., as long as this course is not already counted towards the 131 semester credit hour minimum required for the VT BSME degree.
5.0 Virginia Tech senior year courses to be substituted by Technische Universität Darmstadt courses

With the above preparatory changes to the standard Virginia Tech Bachelor of Science in Mechanical Engineering plan of study, as described in Section 4.1 and illustrated in Figure 1, the following Virginia Tech BSME courses remain for the senior year:

- ME 3504 Dynamic Systems – Vibrations; or
- ME 4504 Dynamic Systems – Controls Engineering I .......... 3 semester credit hours
- ME 4006 Mechanical Engineering Laboratory II .............. 3 semester credit hours
- ME 4015 Engineering Design and Project I ..................... 3 semester credit hours
- ME 4016 Engineering Design and Project II ................. 3 semester credit hours
- ME 4124 Fluids-Heat Transfer Design ......................... 3 semester credit hours
- VT ME technical electives (list 1) ............................. 9 semester credit hours
- AREA 3 elective ......................................................... 3 semester credit hours

TOTAL REMAINING VT BSME CREDITS .............................. 27 semester credit hours

These courses may be individually taken at Virginia Tech, or they may be completed at Technische Universität Darmstadt in the form of corresponding approved equivalent sets of courses (i.e., not necessarily on a one-to-one course equivalence basis), as detailed in Section 6.0. The following plan of study illustrates how the above remaining courses can be completed at Technische Universität Darmstadt as a whole:

- Systemtheorie und Regelungstechnik (Control Engineering) .......... 6 CP ECTS
- Einführung in wissenschaftliches Arbeiten und Schreiben
  (Introduction into scientific working and writing) .................. 2 CP ECTS
- Product Design Project .................................................. 4 CP ECTS
- Tutorium Pneumatik I (Tutorial Pneumatics I) ..................... 4 CP ECTS
- Bachelor-Thesis ................................................................ 12 CP ECTS
- Grundlagen der Turbomaschinen und Fluidsysteme
  (Fundamentals of Turbomachinery and Fluid Systems) ............ 8 CP ECTS
- Aerodynamik I (Aerodynamics I); or
- Grundlagen der Flugantriebe (Flight Propulsion Fundamentals) .... 6 or 8 CP ECTS
- TUD ME technical electives (from approved list) .................. 6 or 4 CP ECTS
- AREA 3 elective (from approved list) .................................. 6 CP ECTS

TOTAL REMAINING VT BSME CREDITS .............................. 54 CP ECTS
5.1 VT-TUD dual BSME degree option

With slightly more effort, and by selecting certain specific courses that count as Virginia Tech BSME technical electives, a Virginia Tech BSME student can also earn the Technische Universität Darmstadt Bachelor of Science degree in the field of Mechanical and Process Engineering.

<table>
<thead>
<tr>
<th>Course Description</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systemtheorie und Regelungstechnik (Control Engineering)</td>
<td>6</td>
</tr>
<tr>
<td>Einführung in wissenschaftliches Arbeiten und Schreiben (Introduction into scientific working and writing)</td>
<td>2</td>
</tr>
<tr>
<td>Product Design Project</td>
<td>4</td>
</tr>
<tr>
<td>Tutorium Pneumatik I (Tutorial Pneumatics I)</td>
<td>4</td>
</tr>
<tr>
<td>Bachelor-Thesis</td>
<td>12</td>
</tr>
<tr>
<td>Grundlagen der Turbomaschinen und Fluidsysteme (Fundamentals of Turbomachinery and Fluid Systems)</td>
<td>8</td>
</tr>
<tr>
<td>Aerodynamik I (Aerodynamics I); or</td>
<td></td>
</tr>
<tr>
<td>Grundlagen der Flugantriebe (Flight Propulsion Fundamentals)</td>
<td>6 or 8</td>
</tr>
<tr>
<td>Numerische Berechnungsverfahren (Numerical Methods)</td>
<td>4</td>
</tr>
<tr>
<td>TUD ME technical electives (from approved list)</td>
<td>4</td>
</tr>
<tr>
<td>Free electives</td>
<td>2</td>
</tr>
<tr>
<td>AREA 3 elective (from approved list)</td>
<td>6</td>
</tr>
</tbody>
</table>

TOTAL REMAINING: 60 CP ECTS

That is, the following courses are required when pursuing the Technische Universität Darmstadt Bachelor of Science degree in the field of Mechanical and Process Engineering in addition to the Virginia Tech Bachelor of Science in Mechanical Engineering requirements:

<table>
<thead>
<tr>
<th>Course Description</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numerische Berechnungsverfahren (Numerical Methods)</td>
<td>4</td>
</tr>
<tr>
<td>Free electives</td>
<td>2</td>
</tr>
</tbody>
</table>

These extra courses can be completed entirely within the context of the Virginia Tech BSME technical elective requirement. Hence, within this standard plan of study for the VT-TUD dual BSME degree program, the students will complete the following credits towards the Virginia Tech BSME technical elective requirement:

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Design Project</td>
<td>1</td>
</tr>
<tr>
<td>Tutorium Pneumatik I (Tutorial Pneumatics I)</td>
<td>1</td>
</tr>
<tr>
<td>Grundlagen der Turbomaschinen und Fluidsysteme (Fundamentals of Turbomachinery and Fluid Systems)</td>
<td>2</td>
</tr>
<tr>
<td>Aerodynamik I (Aerodynamics I); or</td>
<td>2-3</td>
</tr>
<tr>
<td>Grundlagen der Flugantriebe (Flight Propulsion Fundamentals)</td>
<td>2-3</td>
</tr>
<tr>
<td>Numerische Berechnungsverfahren (Numerical Methods)</td>
<td>2</td>
</tr>
<tr>
<td>TUD ME technical electives (from approved list)</td>
<td>2</td>
</tr>
</tbody>
</table>

TOTAL VT BSME TECHNICAL ELECTIVES: 11 semester credit hours
Hence, students that do not complete any Virginia Tech BSME technical electives in Blacksburg (e.g., GER 2xxx/3xxx) must add another 4 semester credits hours (8 CP ECTS) of TUD ME technical electives to meet the Virginia Tech BSME technical elective minimum of 15 semester credit hours.

**Important Requirement:** To earn a Bachelor of Science degree at the Technische Universität Darmstadt, at least 60 CP ECTS must be earned at the Technische Universität Darmstadt.

**Variation I:** There is a limited selection of AREA 2/3/7 approved courses at Technische Universität Darmstadt. Students may redistribute their AREA 2/3/7 courses between the two universities as long as the courses do not overlap when transferred. If all AREA 2/3/7 courses are completed at Virginia Tech, then additional TUD ME technical electives or German language courses must be completed to maintain the 60 CP ECTS minimum.

**Variation II:** Up to 3 semester credit hours (6 CP ECTS) of certain Virginia Tech BSME technical electives can be transferred to Technische Universität Darmstadt as technical electives. If so, then additional non-duplicating TUD ME technical electives or German language courses must be completed to maintain the 60 CP ECTS minimum. The following courses are approved:

**Mechanical Engineering**

<table>
<thead>
<tr>
<th>COURSE NUMBER AND NAME</th>
<th>SEMESTER CREDIT HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4134: Air Conditioning</td>
<td>3</td>
</tr>
<tr>
<td>4144: Refrigeration and Cryogenic Engineering</td>
<td>3</td>
</tr>
<tr>
<td>4154: Industrial Energy Systems</td>
<td>3</td>
</tr>
<tr>
<td>4164: Energy Systems for Buildings</td>
<td>3</td>
</tr>
<tr>
<td>4174: Spacecraft Propulsion (same as AOE 4174)</td>
<td>3</td>
</tr>
<tr>
<td>4194: Sustainable Energy Solutions for a Global Society (same as ESM 4194)</td>
<td>3</td>
</tr>
<tr>
<td>4204: Internal Combustion Engines</td>
<td>3</td>
</tr>
<tr>
<td>4214: Power Generation</td>
<td>3</td>
</tr>
<tr>
<td>4224: Aircraft Engines and Gas Turbines</td>
<td>3</td>
</tr>
<tr>
<td>4234: Aerospace Propulsion Systems (same as AOE 4234)</td>
<td>3</td>
</tr>
<tr>
<td>4244: Marine Engineering (same as AOE 4244)</td>
<td>3</td>
</tr>
<tr>
<td>4254: Ramjet and Rocket Propulsion</td>
<td>3</td>
</tr>
<tr>
<td>4404: Fluid Mechanics II</td>
<td>3</td>
</tr>
<tr>
<td>4424: Thermodynamics of Fluid Flow</td>
<td>3</td>
</tr>
<tr>
<td>4434: Fluid Power Systems and Control (same as BSE 4424)</td>
<td>3</td>
</tr>
<tr>
<td>4444: Rotating Machinery</td>
<td>3</td>
</tr>
<tr>
<td>4524: Introduction to Robotics and Automation</td>
<td>3</td>
</tr>
<tr>
<td>4534: Land Vehicle Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>4544: Automotive Engineering</td>
<td>3</td>
</tr>
<tr>
<td>4554: Advanced Technology for Motor Vehicles</td>
<td>3</td>
</tr>
<tr>
<td>4604: Mechanisms</td>
<td>3</td>
</tr>
<tr>
<td>4614: Mechanical Design II</td>
<td>3</td>
</tr>
<tr>
<td>4624: Finite Element Practice in Mechanical Design</td>
<td>3</td>
</tr>
</tbody>
</table>
4634: Introduction to Computer Aided Design and Manufacturing ................................................................. 3
4644: Introduction to Rapid Prototyping ........................................................................................................ 3
4664: Introduction to Global Collaborative Engineering Design ................................................................. 3
4704: Tribology (same as MSE 4064) ............................................................................................................ 3
4714: Theory and Application of Hydrodynamic Lubrication ................................................................... 3
4724: Engineering Acoustics ....................................................................................................................... 3
4734: Mechatronics (same as ECE 4734) .................................................................................................... 3
4864: Micro/Nano-Robotics ......................................................................................................................... 3

Aerospace and Ocean Engineering

<table>
<thead>
<tr>
<th>COURSE NUMBER AND NAME</th>
<th>SEMESTER CREDIT HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4064: Fluid Flow in Nature</td>
<td>................................................................. 3</td>
</tr>
<tr>
<td>4084: Engineering Design Optimization (ESM 4084)</td>
<td>................................................................. 3</td>
</tr>
<tr>
<td>4114: Applied Computational Aerodynamics</td>
<td>................................................................. 3</td>
</tr>
<tr>
<td>4124: Configuration Aerodynamics</td>
<td>................................................................. 3</td>
</tr>
<tr>
<td>4134: Astromechanics</td>
<td>............................................................................................................. 3</td>
</tr>
<tr>
<td>4140: Spacecraft Dynamics and Control</td>
<td>.......................................................................................... 3</td>
</tr>
<tr>
<td>4144: Aircraft Automatic Flight Control</td>
<td>......................................................................................... 3</td>
</tr>
<tr>
<td>4204: Ocean Acoustics</td>
<td>............................................................................................................. 3</td>
</tr>
<tr>
<td>4214: Ocean Wave Mechanics</td>
<td>............................................................................................................. 3</td>
</tr>
<tr>
<td>4224: Probabilistic Analysis of Ocean Systems</td>
<td>.......................................................................................... 3</td>
</tr>
<tr>
<td>4274: Computer Based Design of Ocean Structures</td>
<td>......................................................................................... 3</td>
</tr>
<tr>
<td>4334: Ship Dynamics</td>
<td>............................................................................................................. 3</td>
</tr>
<tr>
<td>4344: Dynamics of High-Speed Marine Craft</td>
<td>.......................................................................................... 3</td>
</tr>
<tr>
<td>4434: Introduction to Computational Fluid Dynamics</td>
<td>......................................................................................... 3</td>
</tr>
</tbody>
</table>

Industrial and Systems Engineering

<table>
<thead>
<tr>
<th>COURSE NUMBER AND NAME</th>
<th>SEMESTER CREDIT HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4244: Fundamentals of Computer Integrated Manufacturing</td>
<td>................................................................. 3</td>
</tr>
<tr>
<td>4264: Industrial Automation</td>
<td>.......................................................................................... 3</td>
</tr>
</tbody>
</table>

Chemical Engineering

<table>
<thead>
<tr>
<th>COURSE NUMBER AND NAME</th>
<th>SEMESTER CREDIT HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4134: Chemical Process Modeling</td>
<td>................................................................. 2</td>
</tr>
<tr>
<td>4214: Introduction to Polymer Materials</td>
<td>......................................................................................... 3</td>
</tr>
<tr>
<td>4224: Introduction to Polymer Processing</td>
<td>.......................................................................................... 3</td>
</tr>
</tbody>
</table>

Materials Science and Engineering

<table>
<thead>
<tr>
<th>COURSE NUMBER AND NAME</th>
<th>SEMESTER CREDIT HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4554: Polymer Engineering</td>
<td>.......................................................................................... 3</td>
</tr>
<tr>
<td>4604: Composite Materials</td>
<td>.......................................................................................... 3</td>
</tr>
</tbody>
</table>
6.0 Course equivalences

This section describes the courses that have been approved for transfer from Technische Universität Darmstadt to Virginia Tech in the context of the Virginia Tech BSME senior year abroad program. This includes, required courses, technical electives, Green Engineering minor courses, and AREA 2/3/7 courses. Updates to these lists can be found at:

http://www.tud.vt.edu/BS

6.1 Engineering courses

**Required Courses:** Figure 2 shows the Technische Universität Darmstadt course equivalences for the following required Virginia Tech courses:

- ME 4504 Dynamic Systems – Controls Engineering I
- ME 4006 Mechanical Engineering Laboratory II
- ME 4015 Engineering Design and Project I
- ME 4016 Engineering Design and Project I
- ME 4124 Fluids-Heat Transfer Design

For instance, consider Equivalence #3a in Figure 2: By passing the courses Grundlagen der Turbomaschinen und Fluidsysteme (Fundamentals of Turbomachinery and Fluid Systems), and Aerodynamik I (Aerodynamics I) at the Technische Universität Darmstadt, transfer credit may be awarded by Virginia Tech for the courses ME 4124 Fluids-Heat Transfer Design (3 semester credit hours), and ME 4xxx Technical Elective (4 semester credit hours). It is important to note that the equivalence for these courses is as a set and not individually. Hence, a student must pass both courses at the Technische Universität Darmstadt in order be awarded the corresponding transfer credits by Virginia Tech.

**Technical Electives:** Figure 3 shows the Technische Universität Darmstadt courses that are approved for transfer to Virginia Tech as Virginia Tech BSME technical electives. For instance, the course Verbrennungskraftmaschinen I (Combustion Engines I) is offered during the TUD Winter-semester, it is weighted 6 CP ECTS, and it will transfer to Virginia Tech as 3 semester credit hours of ME 4xxx Technical Elective.
### Course Transfer Equivalences from the Technische Universität Darmstadt (Darmstadt University of Technology) to Virginia Tech:

The Faculty of Mechanical Engineering at Virginia Tech have found the following sets of courses at the Technische Universität Darmstadt (TUD) to be equivalent to the corresponding sets of courses at Virginia Tech.

#### One-to-one equivalencies (required courses):

<table>
<thead>
<tr>
<th>TUD Course Title</th>
<th>Virginia Tech Equivalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numerische Berechnungsverfahren</td>
<td>VT BSME technical elective (ME 4XXX)</td>
</tr>
<tr>
<td>Numerical Methods</td>
<td></td>
</tr>
<tr>
<td>Systemtheorie und Regelungstechnik</td>
<td>ME 4504 Dynamic Systems – Controls Engineering I</td>
</tr>
<tr>
<td>Control Engineering (ME version, summer semesters)</td>
<td>3 credits</td>
</tr>
<tr>
<td>Systemdynamik und Regelungstechnik I</td>
<td>ME 4504 Dynamic Systems – Controls Engineering I</td>
</tr>
<tr>
<td>Control Engineering (EE version, winter semesters)</td>
<td>3 credits</td>
</tr>
</tbody>
</table>

#### Equivalence #1 (required course):

<table>
<thead>
<tr>
<th>Course Title</th>
<th>TUD Equivalent</th>
<th>Virginia Tech Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor-Thesis</td>
<td>ME 4015 Engineering Design &amp; Project I</td>
<td>ME 4016 Engineering Design &amp; Project II</td>
</tr>
<tr>
<td>Bachelor-Thesis</td>
<td>6 CP ECTS, 3 cr</td>
<td>6 CP ECTS, 3 cr</td>
</tr>
</tbody>
</table>

#### Equivalence #2 (required course):

<table>
<thead>
<tr>
<th>Course Title</th>
<th>TUD Equivalent</th>
<th>Virginia Tech Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Einführung in wissenschaftliches Arbeiten und Schreiben</td>
<td>ME 4006 Mechanical Engineering Lab II</td>
<td>VT BSME technical elective (ME 4XXX)</td>
</tr>
<tr>
<td>Introduction into scientific working and writing</td>
<td>2 CP ECTS, 1 cr</td>
<td>2 CP ECTS, 1 cr</td>
</tr>
<tr>
<td>Product Design Project</td>
<td>2 CP ECTS, 1 cr</td>
<td>2 CP ECTS, 1 cr</td>
</tr>
<tr>
<td>Tutorium Pneumatik I</td>
<td>2 CP ECTS, 1 cr</td>
<td>2 CP ECTS, 1 cr</td>
</tr>
<tr>
<td>Tutorial Pneumatics I</td>
<td>6 CP ECTS, 3 cr</td>
<td>4 CP ECTS, 2 cr</td>
</tr>
</tbody>
</table>

The students will be required to complete one of the following two combinations:

#### Equivalence #3a:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>TUD Equivalent</th>
<th>Virginia Tech Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grundlagen der Turbomaschinen und Fluidsysteme</td>
<td>ME 4124 Fluid Machinery - Heat Transfer Design</td>
<td>VT BSME technical elective (ME 4XXX)</td>
</tr>
<tr>
<td>Fundamentals of Turbomachinery and Fluid Systems</td>
<td>4 CP ECTS, 2 cr</td>
<td>4 CP ECTS, 2 cr</td>
</tr>
<tr>
<td>Aerodynamik I</td>
<td>2 CP ECTS, 1 cr</td>
<td>4 CP ECTS, 2 cr</td>
</tr>
<tr>
<td>Aerodynamics I</td>
<td>6 CP ECTS, 3 cr</td>
<td>8 CP ECTS, 4 cr</td>
</tr>
</tbody>
</table>

#### Equivalence #3b:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>TUD Equivalent</th>
<th>Virginia Tech Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grundlagen der Turbomaschinen und Fluidsysteme</td>
<td>ME 4124 Fluid Machinery - Heat Transfer Design</td>
<td>VT BSME technical elective (ME 4XXX)</td>
</tr>
<tr>
<td>Fundamentals of Turbomachinery and Fluid Systems</td>
<td>4 CP ECTS, 2 cr</td>
<td>4 CP ECTS, 2 cr</td>
</tr>
<tr>
<td>Grundlagen der Flugantriebe</td>
<td>2 CP ECTS, 1 cr</td>
<td>6 CP ECTS, 3 cr</td>
</tr>
<tr>
<td>Flight Propulsion Fundamentals</td>
<td>6 CP ECTS, 3 cr</td>
<td>10 CP ECTS, 5 cr</td>
</tr>
</tbody>
</table>

Figure 2: Technische Universität Darmstadt course equivalences for required Virginia Tech BSME senior year courses.

**Courses at the Technische Universität Darmstadt (TUD) that are approved for transfer to Virginia Tech as ME 4xxx Technical Elective**

<table>
<thead>
<tr>
<th>German TUD transcript text:</th>
<th>English TUD transcript text:</th>
<th>TUD Credits</th>
<th>VT Semester</th>
<th>VT Course</th>
<th>ECTS (CP)</th>
<th>VT Semester</th>
<th>VT Course Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerodynamik I *</td>
<td>Aerodynamics I</td>
<td>6</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angleprodukteindustrie</td>
<td>Applied Product Development</td>
<td>4</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Einführung in die Druck- und Medientechnik</td>
<td>Introduction to Printing and Media Technology</td>
<td>4</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Einführung in die Kunststofftechnik</td>
<td>Introduction into Polymer Technology</td>
<td>4</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Einführung in die Papiertechnik</td>
<td>Introduction into Paper Technology</td>
<td>4</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elektronik</td>
<td>Electronics</td>
<td>4</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elektrotechnik und Informationstechnik II</td>
<td>Electrical Engineering and Information Technology II</td>
<td>7</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energie und Klimaschutz</td>
<td>Energy and Climate Change</td>
<td>4</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flugmechanik I: Flügelleistungen</td>
<td>Flight Mechanics I: Performance</td>
<td>6</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gestaltung von Mensch-Maschine-Schnittstellen</td>
<td>Design of Human-Machine-Interfaces</td>
<td>6</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grundlagen der Flugantriebe</td>
<td>Flight Propulsion Fundamentals</td>
<td>8</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grundlagen der Turbomaschinen und Fluidsysteme *</td>
<td>Fundamentals of Turbomachinery and Fluid Systems *</td>
<td>8</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internationales Projekt (ISP)</td>
<td>International Research Project</td>
<td>Variable</td>
<td>WS / SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Konstruieren mit Faser-Kunststoff-Verbunden I</td>
<td>Design with Advanced Composite Materials I</td>
<td>8</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Konstruktionsprinzipien im Druckmaschinenbau</td>
<td>Design Principles in Printing Press Construction</td>
<td>4</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kraftfahrzeugtechnik</td>
<td>Motor Vehicles</td>
<td>6</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laser in der Fertigung</td>
<td>Lasers in Manufacturing</td>
<td>4</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logischer Entwurf</td>
<td>Logic Design</td>
<td>6</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanische Verfahrenstechnik</td>
<td>Mechanical Process Engineering</td>
<td>4</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nachhaltige Verbrennungstechnologien A</td>
<td>Efficient combustion technologies A</td>
<td>8</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Praktikum Aktoren für mechatronische Systeme</td>
<td>Practical Course with mechatronic actuators</td>
<td>4</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Praktikum Regelung mechatronischer Systeme</td>
<td>Lab Tutorial Control of Mechatronic Systems</td>
<td>4</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Praktische Farbmessung</td>
<td>Applied Colorimetry</td>
<td>4</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermische Verfahrenstechnik I - Thermodynamik der Gemische</td>
<td>Chemical Engineering Thermodynamics</td>
<td>4</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermische Verfahrenstechnik II - Verfahrenstechnische Grundoperationen</td>
<td>Equilibrium- and Non-Equilibrium-Stage Separation Processes</td>
<td>4</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbrennungskraftmaschinen I</td>
<td>Combustion Engines I</td>
<td>6</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Werkstofftechnologie und -anwendung</td>
<td>Materials Technology and Applications</td>
<td>6</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Werkzeugmaschinen und Industrieroboter</td>
<td>Machine Tools and Industrial Robots</td>
<td>8</td>
<td>WS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Unless used to meet other course requirements

---

Figure 3: Technische Universität Darmstadt mechanical engineering technical electives approved for transfer to Virginia Tech as ME 4xxx Technical Elective.


**Virginia Tech Green Engineering Minor:** Senior capstone design projects (e.g., ME 4015-4016) completed at the Technische Universität Darmstadt (e.g., Bachelor-Thesis) may be eligible for substitution as Engineering Elective courses toward the Virginia Tech Green Engineering Minor ([http://www.eng.vt.edu/green](http://www.eng.vt.edu/green)). Either 3 or 6 semester credit hours may be awarded depending on the scope of the work. Students should contact Dr. Sean McGinnis, director of Virginia Tech Green Engineering ([smcginn@vt.edu](mailto:smcginn@vt.edu)), before projects are completed (and preferably prior to departing for Technische Universität Darmstadt) if they are interested in this option. To count toward the minor, senior capstone design projects must have content that focuses on the environmental impact of engineering practice. It is not sufficient to simply work on a project that is related to green engineering, but environmental impacts must be considered formally as part of the project. Typically, students and their advisor can work with Dr. McGinnis to ensure the project deliverables meet the requirements for consideration for this minor. Such capstone design projects are highly encouraged by the program. Requests for minor substitutions must be approved by Dr. McGinnis and the Virginia Tech College of Engineering Dean of Academic Affairs. (Updated: October 20, 2009)
6.2 **AREA 2/3/7 courses**

A small number of courses at Technische Universität Darmstadt have been preapproved as Virginia Tech AREA 2/3/7 courses:

**AREA 2 (humanities) courses:**

- *Philosophie für Maschinenbauer* (Philisophy for Mechanical Engineers) transfers as PHIL 2605 *Reason and Revolution in Science*, counting as 3 semester credit hours (6 CP ECTS) and satisfying both AREA 2 and AREA 7. This course is taught in German. Approved October 7, 2009.

- *Utopian Fiction* transfers as ENGL 2XXX, counting as 3 semester credit hours (6 CP ECTS) and satisfying AREA 2. This course is taught in English. Approved March 22, 2010.

**AREA 3 (social science) courses:**

- *Theorie: The Liberalism-Communitarianism Debate* satisfies both AREA 3 and AREA 7. The extended version of this course (6 CP ECTS) transfers as 3 semester credit hours of PSCI 1024 *Introduction to Comparative Government and Politics*. This course is taught in English. Approved March 15, 2010.

- *Public Policies im Mehrebenensystem* (Public Policies in Multi-Level Systems). The extended version of this course (6 CP ECTS) transfers as 3 semester credit hours, either as PSCI 3515 *European Political Systems* (not an AREA course) or as PSCI 1024 *Introduction to Comparative Government and Politics* (AREA 3 and AREA 7). This course is taught in German. Approved March 19, 2010.

- *Einführung in den Vergleich politischer Systeme* (Introduction to Comparative Political Systems). The extended version of this course (6 CP ECTS) transfers as 3 semester credit hours, as PSCI 1024 *Introduction to Comparative Government and Politics* (AREA 3 and AREA 7). This course is taught in German. Approved March 23, 2010.

- *Europäische Urbanisierung und Umwelt 1000 - 2000* (European Urbanization the Surrounding World 1000-2000). The extended version of this course (6 CP ECTS) transfers as UAP 3xxx (AREA 3 and AREA 7). This course is taught in German. Approved March 24, 2010.

- *Einführung in die Psychologie* (Introduction to Psychology) transfers as PSYC 2004 *Introduction to Psychology* (AREA 3). This course is taught in German. Approved April 8, 2010.

- *Ingenieurinnen und Ingenieure in der Gesellschaft* (Engineers in Society) transfers as STS 2XXX Elective (AREA 3). This course is taught in German. Approved September 2, 2014.
The tradition of humanities and social science courses at Technische Universität Darmstadt differs from those in mechanical engineering. They tend to have more variable credits, and they tend to have more turnovers in course names and topics:

**Variable course credits:** Students in the same course may earn different amounts of course credits, depending on the course assignments that they participate in. Virginia Tech BSME students must therefore make sure that they sign up for enough credits to match the three-semester-credit-hour standard at Virginia Tech: 6 CP ECTS equals 3 semester credit hours.

**Turn over in course names:** The lifespan of a course may be short before its name and content is modified. When this happens, the new course-name and its new content must be approved by Virginia Tech for transfer. The process for this is the same as for all new courses:

- **Process for preapproval of course credit transfer:** Obtain a detailed course syllabus in English. If possible, include a list of textbooks used in the course, and the name of the professor in charge of the course. Submit your request with this information to Mr. Ryan Wagoner rdw@vt.edu in 100-F2 Randolph Hall. Mr. Wagoner will then coordinate the evaluation with the appropriate department at Virginia Tech that is authorized to approve the transfer.

Virginia Tech BSME students are strongly encouraged to follow this process to seek approval of additional humanities and social science courses at Technische Universität Darmstadt that interest them and that they would like to have approved for AREA 2/3/7 credit at Virginia Tech. As these courses are approved, they will be listed online at http://www.tud.vt.edu/BS, and, over time, the availability of preapproved AREA 2/3/7 courses should thus grow significantly.
7.0 Transfer credit process

7.1 Transfer credits from Technische Universität Darmstadt to Virginia Tech

Virginia Tech BSME students taking courses at Technische Universität Darmstadt must follow the following three-step procedure for having their course credits transferred to Virginia Tech and applied towards their Virginia Tech BSME degree:

1. **Complete the Virginia Tech College of Engineering Transfer Credit Request Form.** The instructions for completing this form are given on the form. Follow these instructions. If you have questions regarding this form, please contact Mr. Ryan Wagoner [rdw@vt.edu](mailto:rdw@vt.edu) in 100-F2 Randolph Hall. The form is shown in Figure 4a, it is partially completed in Figure 4b, and it can be found online as follows:

   **Transfer Credit Request form for International/Study Abroad schools:**
   *Read and follow these policies and procedure:*
   - [http://www.eng.vt.edu/students/transferring-credits](http://www.eng.vt.edu/students/transferring-credits)
   - [https://www.eng.vt.edu/sites/default/files/pageattachments/international-transfer-credit-evaluation-documentrevised2-4-2016.pdf](https://www.eng.vt.edu/sites/default/files/pageattachments/international-transfer-credit-evaluation-documentrevised2-4-2016.pdf)

   **Transfer Credit Request form used for this particular program:**
   *Until further notice—due to the complexity of describing the proposed credit transfer—use the following form:*
   - [http://www.tud.vt.edu/BS/study_abroad_transfer_credit_form revised 6-2-2011 SAMPLE 2016.pdf](http://www.tud.vt.edu/BS/study_abroad_transfer_credit_form revised 6-2-2011 SAMPLE 2016.pdf)
   - [http://www.tud.vt.edu/BS/study_abroad_transfer_credit_form revised 6-2-2011 SAMPLE 2016.doc](http://www.tud.vt.edu/BS/study_abroad_transfer_credit_form revised 6-2-2011 SAMPLE 2016.doc)

Make sure that you list the English course names and not the German course names.

Make sure that you sign the form, and that the Virginia Tech Global Education Office signs the form, before you submit it to Mr. Wagoner.

You should submit this form before you depart Virginia Tech. If you need to make changes to your course selection, including after you have departed Virginia Tech, then you need to update your form with Mr. Wagoner as soon as possible.
Virginia Tech - College of Engineering

Transfer Credit Request Form - EDUCATION / STUDY ABROAD

Courses must be pre-approved by the College of Engineering Academic Dean's Office/212 Hancock Hall.

1. Courses must be taken through either a study abroad program offered by an accredited college or university in the U.S. or an institution recognized by the Ministry of Education.
2. Only courses in which the student earned a grade of "C" or better will transfer. Home study, correspondence and Pass/Fail courses will not transfer.
3. Only credits earned transfer. Grades do not transfer and do not figure into a student's Virginia Tech GPA computation.
4. Where credits are given at the other school towards their equivalent Virginia Tech course, the only the Virginia Tech credit hours will be granted.
5. A course passed at Virginia Tech takes priority over an equivalent transfer course, regardless of when the transfer course is taken or the grade earned. Courses that duplicate previously studied material will not transfer.
6. There are many details to the study abroad process.

Policies Governing Transfer Credit to Virginia Tech:

1. Completing the Transfer Credit Request Form
2. Choose a school and courses. Check with the transfer school to ensure the courses you want to take will be offered during your semester of attendance. Contact the Study Abroad Advisor at rdw@vt.edu for a list of schools offering engineering programs.
3. If the institution you wish to attend requires a letter of good standing from Virginia Tech, you may request this certification by filling out a form in the Registrar’s office, 250 Student Services Building.
4. Meet with academic advisor to discuss taking courses elsewhere and for consideration.
5. Go to EducaReceived a study abroad program offered by an accredited college or university in the U.S.
6. A minimum of 24 semester hours must be completed at Virginia Tech prior to graduation.
7. A course passed at Virginia Tech takes priority over a course in the same field.
8. When credit hours given at the other school exceed those for the equivalent Virginia Tech course, only the Virginia Tech credit hours will be granted.

Completing the Transfer Credit Request Form:

1. Complete a school and courses. Check with the transfer school to ensure the courses you want to take will be offered during your term(s) of attendance. Contact the Study Abroad Advisor at rdw@vt.edu for a list of schools offering engineering programs.
2. If the institution you wish to attend requires a letter of good standing from Virginia Tech, you may request this certification by filling out a form in the Registrar's office, 250 Student Services Building.
3. Meet with academic advisor to discuss taking courses elsewhere and for consideration.
4. Go to EducaReceived a study abroad program offered by an accredited college or university in the U.S.
5. A minimum of 24 semester hours must be completed at Virginia Tech prior to graduation.
6. A course passed at Virginia Tech takes priority over a course in the same field.
7. When credit hours given at the other school exceed those for the equivalent Virginia Tech course, only the Virginia Tech credit hours will be granted.

STUDENT SIGNATURE
Student signature above affirms that the student understands transfer policies and knows how this will impact degree requirements.

Rev. 6/11

Figure 4a:

Transfer Credit Request Form

http://www.tud vt.edu/BS/

study_abroad_transfer_credit_form revised 6-2-2011 SAMPLE 2016.doc

Figure 4b:

Sample entries in the Transfer Credit Request Form shown in Figure 4a.

Please reference Figures 2 and 3 and Section 6.2 for details.

http://www.tud vt.edu/BS/

study_abroad_transfer_credit_form revised 6-2-2011 SAMPLE 2016.pdf
2. **Complete the approved courses with the equivalent grades of “C” or better.** The Virginia Tech Registrar will not award transfer credit for grades below “C”.

The Technische Universität Darmstadt does not issue letter grades. Instead, it issues numerical grades ranging from “1.0” (best) to “4.0” (passing), with “5.0” denoting failure.

The Virginia Tech Registrar therefore uses the World Education Services (WES) scale for converting numerical grades from Technische Universität Darmstadt to their Virginia Tech letter grade equivalents (Figure 5). Hence, all passing grades from Technische Universität Darmstadt (i.e., 1.0, 1.3, 1.7, 2.0, 2.3, 2.7, 3.0, 3.3, 3.7, and 4.0) are accepted for transfer of coursework. Failing grades (i.e., 5.0) are not accepted for transfer credit.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Grade Description</th>
<th>U.S. Grade Equiv.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1.5</td>
<td>Sehr Gut (Very Good)</td>
<td>A</td>
</tr>
<tr>
<td>1.6-2.5</td>
<td>Gut (Good)</td>
<td>A</td>
</tr>
<tr>
<td>2.6-3.5</td>
<td>Befriedigend (Satisfactory)</td>
<td>B</td>
</tr>
<tr>
<td>3.6-4.0</td>
<td>Ausreichend (Sufficient)</td>
<td>C</td>
</tr>
<tr>
<td>4.1-6</td>
<td>Nicht Ausreichend (Insufficient)</td>
<td>F</td>
</tr>
</tbody>
</table>

Figure 5: World Education Services (WES) grading scale conversion between German and US. Original document: [http://www.wes.org/gradeconversionguide/index.asp](http://www.wes.org/gradeconversionguide/index.asp)

3. **Submit an official transcript to the VT Registrar.** Once your grades have been posted on the TUCaN online system at Technische Universität Darmstadt, you need to request that Ms. Gabriele von Laufenberg laufenberg@mechcenter.tu-darmstadt.de TEL: +49-6151-16-75647 at the Technische Universität Darmstadt MechCenter send a paper copy of your official Technische Universität Darmstadt transcript to:

Sarah Deisher  
Mechanical Engineering (0710)  
Randolph Hall, 113-A, Virginia Tech  
460 Old Turner Street  
Blacksburg, VA 24061  
USA

TEL: +1-540-231-8592  
E-MAIL: murfvt@vt.edu

Ms. Deisher will then scan the transcript, share it electronically with the Virginia Tech Registrar, and deliver the physical original document to the Virginia Tech Registrar for archiving.
7.2 Date of Virginia Tech BSME graduation

It is important that a paper copy of your official TUD transcript is received by the VT Registrar as soon as possible: As long as this transcript is received by the VT Registrar within 30 days of a Virginia Tech graduation date, then your Virginia Tech degree will be awarded retroactively on that date, once the VT Registrar has determined that you have otherwise completed all your degree requirements.

Example: The August 2017 Virginia Tech graduation date is August 14, 2017. Hence, to earn a Virginia Tech BSME degree effective as of that date, the Virginia Tech Registrar must physically receive a paper copy of your official TUD transcript by September 13, 2017 at the latest. If upon review of this transcript, the VT Registrar determines that you have completed all the requirements for the VT BSME degree (probably some time in October 2017), the VT Registrar will then retroactively award you a VT BSME degree dated August 14, 2017.

7.3 Transfer credits from Virginia Tech to Technische Universität Darmstadt

Virginia Tech BSME students that are participating in the VT-TUD Dual BSME Degree Program must provide Technische Universität Darmstadt with an official paper copy of their Virginia Tech transcript.

Technische Universität Darmstadt will also need official paper copies of transcripts from any and all other colleges and universities that appear on the Virginia Tech transcript as transfer credit that are being used towards the Technische Universität Darmstadt B.Sc. (MPE) degree. For instance, if you have received Virginia Tech transfer credit for a course at Purdue University, then you must provide Technische Universität Darmstadt with an official paper copy of your Purdue University transcript as well.

Technische Universität Darmstadt cannot award transfer credit for your coursework elsewhere, including at Virginia Tech, until they receive the official paper copies of your transcripts.

Official Virginia Tech transcripts can be ordered online from HokieSPA, and should be mailed directly from the Virginia Tech Registrar to:

Dipl. -Geogr. Gabriele von Laufenberg
MechCenter - KIVA Koordinatorin
Fachbereich Maschinenbau
Technische Universität Darmstadt
Otto-Berndt Straße 2
64287 Darmstadt
Germany

Official paper copies of transcripts from other colleges and universities should be mailed directly to the above address as well.
7.4 Credit for German language as VT BSME technical elective (list 2)

Up to 6 semester credit hours of GER 2105, 2106, 2114, 3105, 3106 can be counted as Virginia Tech BSME technical elective (list 2) if at least 9 semester credit hours of engineering courses, that are taught in German, and that count towards the 131-semester-credit-hour requirement for the Virginia Tech BSME degree, are subsequently earned at a foreign educational institution. Similar provisions apply to Spanish, French, and Russian.

To receive these Virginia Tech BSME technical elective (list 2) credits, the students must contact Dr. Linda Vick, Ms. Sarah Deisher, and/or Ms. Heather Whedbee in the Virginia Tech Department of Mechanical Engineering Undergraduate Advising Office upon successful completion of the 9+ semester credit hours of engineering courses abroad:

Dr. Linda Vick
Mechanical Engineering (MC 0710)
Randolph Hall, 113, Virginia Tech
460 Old Turner Street
Blacksburg, VA 24061
USA
TEL: +1-540-231-7747
FAX: +1-540-231-9100
E-MAIL: lvick@vt.edu

Ms. Sarah Deisher
Mechanical Engineering (MC 0710)
Randolph Hall, 113-A, Virginia Tech
460 Old Turner Street
Blacksburg, VA 24061
USA
TEL: +1-540-231-8592
FAX: +1-540-231-9100
E-MAIL: mfurvt@vt.edu

Ms. Heather Whedbee
Mechanical Engineering (MC 0710)
Randolph Hall, 112, Virginia Tech
460 Old Turner Street
Blacksburg, VA 24061
USA
TEL: +1-540-231-2555
FAX: +1-540-231-9100
E-MAIL: heathaw@vt.edu
8.0 How to succeed at Technische Universität Darmstadt

Studying abroad in a foreign language is not trivial. The academic system and traditions are different from what you are used to, and comprehension of the materials is a challenge. The following will highlight differences and suggest best practices for how to succeed at Technische Universität Darmstadt.

8.1 Taking a course at a German university

Universities in Germany operate with a two-semester academic year: The Winter semester runs from mid-October through early-February, and the Summer semester runs from late-April through mid-July. During the semesters the students attend lectures and laboratories, and complete suggested homework assignments. Generally, there is no attendance taken, there is no homework collected, and there are no exams during the semesters. Approximately midway through the semester, the students sign up for a final exam in the course. The exams are scheduled during the periods between the semesters, and they generally count for 100% of the course grade.

At Technische Universität Darmstadt, a student may attempt an exam for a course at most three times, and an exam is offered twice per year. If a student fails an exam three times, then the student is ejected from the degree program. **Exception:** If the three failed exams are written, then, for **one time only** during the student’s entire career at Technische Universität Darmstadt, the student may attempt the exam a fourth time, this time as an oral exam, and the best grade obtainable is then 4.0 (“C”).

Once a student has attempted an exam, the student must pass that course, and may not take another courses in its place. For instance, if you register for an elective course and fail its first (or second) exam, then you must continue taking this exam until you pass the course or fail out of the degree program.

At the beginning of an exam, the professor will ask if you are ill: If you are ill, you may leave the exam to see a physician to obtain a *Prüfungsunfähigkeitsbescheinigung* (“exam excuse slip”). You must deliver this exam excuse slip to the TUD MechCenter the following day at the latest. You will thus have started (or continued) the exam sequence without causing an exam failure (e.g., if this was your first attempt, you will still have three attempts to go).

The course exam is scheduled early during the exam period immediately following the semester it was taught, and late during exam period following the off-semester. Hence, VT BSME students that pass their courses on schedule should complete their exams on time to transfer their course work to Virginia Tech in time for August graduation. On the other hand, students that fail an exam following the Winter-semester lectures, but then pass the exam following the Summer semester, will most likely not have their course credits transferred to Virginia Tech in time for August graduation but become December graduates instead.

Courses with less than 80 students typically have oral exams. For international students, these exams are generally offered in English so as to avoid misunderstandings; however this is at the prerogative of the professor. The student should request the preferred language ahead of time.
An oral exam typically lasts about 20-60 minutes. The exact exam length for a given course is described in the course module description (see TUCaN online system). Three people will be present during the oral exam: the student, the professor, and an academic staff member (witness) taking notes. Any member of the Prüfungskommission also has the right to also attend the exam, though this hardly ever happens. Finally, with the approval of the student being examined, other students that will be taking this oral exam later on, may also attend the exam; though this also hardly ever happens.

For large courses, the professor will typically have a written exam. The default language is German. Increasingly often, the professor will also have an English version of this exam; however, again, this is at the prerogative of the professor. A student desiring an English-language version should request this well ahead of time.

Several weeks after the exam, the tentative results will be posted on the TUCaN online system. For each exam, there will be an appeal day, when you can review your exam answers with the professor or one of his or her assistants. Students are strongly advised to always attend these appeal sessions to improve their grades. The professor will then take any grade appeals under consideration and several days later submit the adjusted grades for recording on your transcript. At this point, you can see your final course grades on the TUCaN online system, and it will appear on subsequent official transcripts that you have sent to the Virginia Tech Registrar (Section 7.1).

### 8.2 Preparing for an exam

German professors do not replicate homework problems on an exam. Instead they take great pride in presenting problems that are new. Hence, you need to know the course material well enough that you can solve problems, including those from old exams, without the aid of textbooks, lecture notes, answer keys, or sample solutions. Old exams and their answer sheets are generally readily available.

Just like at Virginia Tech, the preparation for an exam starts during the semester: Attend all the lectures. Come prepared to class by completing all the suggested readings ahead of the lecture; then takes notes during the lecture; and finally, review your lecture notes after the lecture, and work all the suggested homework problems until you fully understand the material.

Following the semester, review your notes and assigned readings, and continue to work sample problems leading up to your final exam. You will typically have about one exam per week during the exam period.

**Form study teams with your German classmates.** This is critical to your success. Your German classmates are there to graduate. They have learned how the German university system works, and, as seniors, have successfully navigated the transition from the tightly supervised high school system. You need to learn from them, since you need to make this same transition during your first semester in Darmstadt. You will also find that the native German mechanical engineering students are excellent instant-translators during your study sessions. This is important so that you can get an instant answer and do not have to wait until the follow day or week to have, say, a trivial language-question answered.
You should avoid socializing too much or exclusively with other international students. This includes your colleagues from Blacksburg. Seek a balance and include German mechanical engineers in your social life. Many international students are not overly concerned about transferring credits back home and will depart Darmstadt before the exams begin. Consider the following: Of the 17,000+ US students that spend a semester or more in France each year, less than 4,000 transfer any academic credit back to their US university. You are not like these other US students. Rather, you are at the Technische Universität Darmstadt to pass engineering courses, to transfer their credits to Virginia Tech, and to graduate in a timely manner.

At Virginia Tech you are used to having to maintain a grade point average (GPA) above a “C” in order to graduate. An occasional low course grade, even a “D-”, is acceptable towards graduating as long as you offset it with enough other higher course grades.

At Technische Universität Darmstadt, every single course grade must be a 4.0 or better, which is equivalent to a “C”. By the time their mechanical engineering students reach their third year, it is typical that 10-25% of the grades in a course, with an average of 15%, are below a “C” and must be retaken. This distribution of grades is similar to Virginia Tech: Looking at all the Virginia Tech mechanical engineering 3000-level sections during the 2011-2012 academic year, 9-32% of the section grades, with an average of 17%, were below a “C”.

The consequence of failing a course differs widely between Virginia Tech and Technische Universität Darmstadt. If you fail a course at Virginia Tech (earning an “F”), you must retake the entire course, including redoing all homework assignments, projects, quizzes, and exams. You are also barred from enrolling in subsequent courses that have the failed course as a prerequisite. While the bar for passing a course is higher at Technische Universität Darmstadt—you need to earn a “C” or better—the consequence of failing a course is less severe: You only need to retake the exam, and you are not barred from continuing with subsequent courses.

8.3 Continued German language training

Comprehending engineering course lectures requires that you pay close attention. When these lectures are in a foreign language, the effort to pay attention and comprehend the material becomes even more taxing. Most likely you will feel drained by the end of a lecture, especially during the first several months. Your comprehension will be slower than what you are used to in Blacksburg, and you will find that you will need to invest more time in preparing for lectures and reviewing your lecture notes than you are used to.

Eventually, you will start to find that the material comes easier to you as your German language skills improve. Students often discover in late-January or early-February that they are starting to transition from mentally translating from German to English, to thinking in German during the lectures and when interacting with Germans.

By June, students generally think in German and will only occasionally fall back temporarily to English for an occasional word or phrase translation. At that point, the effort required to comprehend engineering lectures in German begins to approach the effort required to comprehend engineering lectures in English.
Research at the Sprachenzentrum (foreign language department) at Technische Universität Darmstadt continuously shows the importance of comprehending lectures to the success of the student. Likewise, their research also shows the importance of continued formal German language training during the regular academic semester at Technische Universität Darmstadt, even if only auditing the course and not taking it for a grade, as a source of ongoing German language support while enrolled in engineering courses being taught in German. This is particularly the case during the first semester at Technische Universität Darmstadt. Hence the following expectation:

**EXPECTATION:** While attending engineering lectures during the Technische Universität Darmstadt Winter- and Summer-semesters (mid-October through mid-July), the participating students are expected to audit or take for a grade a German language course every semester.

**JUSTIFICATION:** Experience at Technische Universität Darmstadt has shown that continuing formal German language training during the academic year significantly improves the student’s ability to follow classroom instruction, and hence significantly increases the likelihood of on-time graduation.

### 8.4 Seeking advice

The Virginia Tech Department of Mechanical Engineering provides information in-person about its senior year abroad program at Technische Universität Darmstadt and the associated dual BSME degree program during various fairs throughout the year (e.g., College of Engineering Open House, VT Study Abroad Fair). Interested students may also contact Dr. Jan Helge Bohn, bohn@vt.edu, 540-231-3276, 114-H Randolph Hall, for specific information throughout the year.

Club Darmstadt is a registered student organization (RSO) at Virginia Tech, and it is a great place to meet other students that plan to attend Technische Universität Darmstadt or that have studied there in the past. Membership is free to all registered Virginia Tech students:

http://gobblerconnect.vt.edu/organization/clubdarmstadt

**Orientation Sessions:**

There are two important orientation sessions each year for Virginia Tech students attending their BSME senior year at Technische Universität Darmstadt. All participating students are expected to attend both these orientation sessions, and all are expected to be familiar with all the material presented. These sessions are designed to help prepare the students to be successful during the senior year at Technische Universität Darmstadt. In addition to providing the best available advice at that point, they will also contain important information concerning any recent policy and/or procedure updates that may be underway or that have been implemented at either university:
Late Spring Semester during Virginia Tech BSME junior year:
This orientation session is organized by the Virginia Tech Department of Mechanical Engineering, and it is held in Blacksburg.

Early Winter Semester during Virginia Tech BSME senior year:
This orientation session is organized by the Technische Universität Darmstadt Faculty of Mechanical Engineering, and it is held in Darmstadt.

There might be additional seminars organized by Virginia Tech and/or Technische Universität Darmstadt concerning going abroad and living in Germany. For instance, the Virginia Tech Global Education Office offers pre-departure orientation sessions to its outgoing students. Participating students are encouraged and expected to seek out and participate in such seminars to maximize their preparation for living and studying abroad.

Academic Advice:
The Virginia Tech BSME students at Technische Universität Darmstadt have two academic advising offices available to them while abroad:

(1) For all issues concerning their Virginia Tech BSME degrees and their classes at Virginia Tech, students should work with Dr. Linda Vick, Ms. Sarah Deisher, and/or Ms. Heather Whedbee in the Virginia Tech Department of Mechanical Engineering Undergraduate Advising Office:

Dr. Linda Vick
Mechanical Engineering (MC 0710)
Randolph Hall, 113, Virginia Tech
460 Old Turner Street
Blacksburg, VA 24061
USA
TEL: +1-540-231-7747
FAX: +1-540-231-9100
E-MAIL: lvick@vt.edu

Ms. Sarah Deisher
Mechanical Engineering (MC 0710)
Randolph Hall, 113-A, Virginia Tech
460 Old Turner Street
Blacksburg, VA 24061
USA
TEL: +1-540-231-8592
FAX: +1-540-231-9100
E-MAIL: mfurvt@vt.edu

Ms. Heather Whedbee
Mechanical Engineering (MC 0710)
Randolph Hall, 112, Virginia Tech
460 Old Turner Street
Blacksburg, VA 24061
USA
TEL: +1-540-231-2555
FAX: +1-540-231-9100
E-MAIL: heathaw@vt.edu
(2) For all issues concerning their Technische Universität Darmstadt B.Sc. (MPE) degrees (in the case of the VT-TUD Dual BSME Degree Program) and their classes at the Technische Universität Darmstadt, students should work with Ms. Gabriele von Laufenberg in the Technische Universität Darmstadt MechCenter:

Dipl. -Geogr. Gabriele von Laufenberg  
MechCenter - KIVA Koordinatorin  
Fachbereich Maschinenbau  
Technische Universität Darmstadt  
Otto-Berndt Straße 2  
64287 Darmstadt  
GERMANY  
TEL: +49-6151-16-75647  
FAX: +49-6151-16-6090  
E-Mail: laufenberg@mechcenter.tu-darmstadt.de

8.5 Progress reports

All Virginia Tech BSME students at the Technische Universität Darmstadt are expected to provide a brief, informal progress report three times per semester while abroad. These progress reports are extremely important to facilitate effective and timely student advising and ongoing program assessment. These brief progress reports should contain the following information:

- **Courses completed and grades earned at Technische Universität Darmstadt;**  
  -- you will know your results well before we do here at Virginia Tech

- **Courses currently attended, including the German language courses being audited;**  
  -- are you continuing your German language training as expected?  
  -- are you actually attending classes on a regular basis?

- **Courses planned for future semesters at Technische Universität Darmstadt;**  
  -- are you adjusting your plans?

- **Courses planned for future semesters at Virginia Tech, if any;**  
  -- are you adjusting your plans?

- **Names and nationalities of study partners; and**  
  -- are you working with German B.Sc. (MPE) students?

- **Thoughts, observations, and concerns.**

Progress report due dates during each semester at Technische Universität Darmstadt:

**Semester progress report 1**  
due by the end of the first week of lectures;

**Semester progress report 2**  
due within a week of registering for that semester’s exams; and

**Semester progress report 3**  
due within a week of completing that semester’s exams.
These progress reports should be sent to:

Dr. Clinton Dancey  
Associate Department Head for Undergraduate Studies  
Mechanical Engineering (MC 0710)  
Randolph Hall, 118-A, Virginia Tech  
460 Old Turner Street  
Blacksburg, VA 24061  
USA  

E-mail: cld@vt.edu
9.0 Summary

9.1 Timeline of events

The following provides a timeline of events for students completing their VT BSME senior year at the Technische Universität Darmstadt, Germany:

Freshman and Sophomore years:

• Take German language courses; pursue a minor in German if possible;
• Become involved in Club Darmstadt;
• Respond to the annual VT Survey (every September) to provide an update on your plans for your VT BSME senior year in Darmstadt; and
• Incorporate 12+ weeks of industry experience as an engineer (e.g., co-op, or summer job)

Junior year:

September

Respond to annual VT Survey of plans for VT BSME senior year in Darmstadt

October

(1) Order passport if needed and keep a copy of your receipt (passport must be valid for 3+ years at this point); and
(2) Apply or update your application for VT BSME graduation (must be current when you submit your program application)

November

Program application form becomes available

December

Students planning to apply for a DAAD Undergraduate Scholarship should apply for admission to the program to ensure sufficient time for letters of recommendation (see Section 2.2)

1st Monday of Spring Semester

Last opportunity to register for GER 1114
January 23, 2017; January 22, 2018

January 31

Scholarship application due to DAAD

2nd Friday of Spring Semester

Application due to VT Mechanical Engineering
January 27, 2017; January 26, 2018

3rd Friday of Spring Semester

VT Mechanical Engineering announces its nominations
February 3, 2017; February 2, 2018
4th Friday of Spring Semester
Application due to the VT Global Education Office
*February 10, 2017; February 9, 2018*

March
Complete VT Department of Mechanical Engineering German language assessment

April
(1) Attend orientation session for VT BSME seniors going to Darmstadt;
(2) Attend other relevant orientation sessions offered by the VT Global Education Office; and
(3) Apply for transfer credit pre-approval (See Section 7.1)

**Senior year in Darmstadt, Germany:**

**Mid-July**
Start of six-week German language “bridge course” if needed
*July 17 - August 25, 2017; July 9 - August 17, 2018*

**Early-September**
Start of five-week German language “intensive phase”

**Mid-October**
(1) Start of TUD Winter Semester;
(2) Submit *Winter Semester Progress Report 1* (See Section 8.5)

**Late-October**
(1) Attend orientation session for VT BSME seniors going to Darmstadt; and
(2) Attend other relevant orientation sessions offered by TUD

**Late-January**
Submit *Winter Semester Progress Report 2* (See Section 8.5)

**Mid-February**
End of TUD Winter Semester; start of exam period

**Late-March**
(1) End of exam period;
(2) Submit *Winter Semester Progress Report 3* (See Section 8.5)

**Early-April**
(1) Start of TUD Summer Semester;
(2) Submit *Summer Semester Progress Report 1* (See Section 8.5)

**Late-June**
Submit *Summer Semester Progress Report 2* (See Section 8.5)

**Mid-July**
End of TUD Summer Semester; start of exam period
Mid-August
(1) Complete on-schedule exams;
(2) Once your TUD course grades have been recorded in TUCaN, have your official TUD paper transcripts sent to the VT Registrar; and
(3) Submit Summer Semester Progress Report 3 (See Section 8.5)

Late-September
End of exam period

October
Upon successfully processing TUD transcripts that were received within 30 days of the VT August graduation date, the VT Registrar awards VT BSME degrees retroactively dated August (see Section 7.2)

DOCUMENT UPDATES:

October 29, 2013: Updated number of credits of German language instruction that other U.S. universities require (Section 3.0).

March 11, 2014: Several clarifications and typographical corrections in Section 3.0.

March 27, 2015: Updates to reflect recent changes to the VT BSME and TUD BSME curricula; changes of VT and TUD addresses; and changes to VT German minor requirements and course transfers.

May 18, 2016: Updated dates, websites, and contact informations.