

ENGINEERING

Student Handbook

for

ENGINEERING

at

Tidewater Community College

2011 – 2012

For the most recent updates to this handbook, see
www.tcc.edu/faculty/webpages/pgordy/handbook.pdf

Revised: 7-25-11

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Engineering at TCC

The curriculum in Engineering at Tidewater Community College is designed for persons who plan to transfer to a four-year college or university to complete a baccalaureate degree program in one of several fields of engineering such as:

- *Aerospace Engineering*
- *Biomedical Engineering*
- *Civil Engineering*
- *Chemical Engineering*
- *Computer Engineering*
- *Electrical Engineering*
- *Environmental Engineering*
- *Mechanical Engineering*
- *Mining/Metallurgical Engineering*
- *Nuclear Engineering*

The curriculum is based on a core of material fundamental to all areas of engineering. This material includes courses which depend heavily on advanced mathematics and sciences applied to engineering fields. The courses offered during this two-year program are very comparable to the first two years of most four-year engineering programs; however, it is essential that students acquaint themselves with the requirements and the curricula of the college or university to which transfer is considered. By obtaining transfer information early, students can avoid later transfer problems such as:

- 1) Each engineering college may not have programs in all engineering fields. For example, if you wish to major in Chemical Engineering, your choices may be somewhat limited.
- 2) Certain engineering programs may require freshman and sophomore level courses that are not a part of TCC's Engineering curriculum. Students may possibly be able to take these courses at TCC or at another local institution. In many cases students can make some course substitutions in the A.S. degree program in order to transfer as efficiently as possible.
- 3) Some engineering departments at certain universities may require a higher GPA than others.

Transfer information has been provided in this booklet for Old Dominion University (ODU) and for Virginia Polytechnic Institute and State University (Virginia Tech) since most TCC Engineering students transfer to these universities. A table of transfer options for colleges in Virginia has also been included. TCC students may also wish to consult with the TCC Counseling Center in planning their programs and selecting electives.

What's New in the 2011-2012 TCC Student Handbook for Engineering ?

- The EGR program has been growing at the Chesapeake Campus and Steve Ezzell has transferred to the Chesapeake Campus. This should provide additional flexibility in scheduling EGR courses.
- TCC has added two new EGR courses: EGR 218 and EGR 230. These courses have been developed to transfer into ODU's new engineering degree: BS in Modeling & Simulation Engineering. See page 27 for more details.

For additional information regarding the Engineering program at TCC, contact:

Paul Gordy, Engineering Program Head, TCC Virginia Beach Campus
Office: H-115 (Advanced Technology Center)
Phone: 822-7175
Paul Gordy's E-mail address: **PGordy@tcc.edu**
Paul Gordy's Home Page: **www.tcc.edu/faculty/webpages/PGordy/**

Selecting an Engineering Discipline

Many factors are involved in choosing an Engineering discipline in which to specialize. Some students have a definite area of preference before they begin their college education, while other students may have difficulty selecting a discipline. Since most Engineering programs are quite similar in the freshman year, students have some time in which to make this decision. Although the sophomore years of most Engineering programs are somewhat similar, there are often some discipline-specific courses required so it is to the students advantage to select a discipline or at least begin to narrow the choices. The junior year of any Engineering program will be almost completely discipline-specific, so all students should have selected an Engineering discipline by the end of their sophomore year. When students transfer from TCC into a four-year Engineering program they will need to apply for transfer into a specific Engineering department.

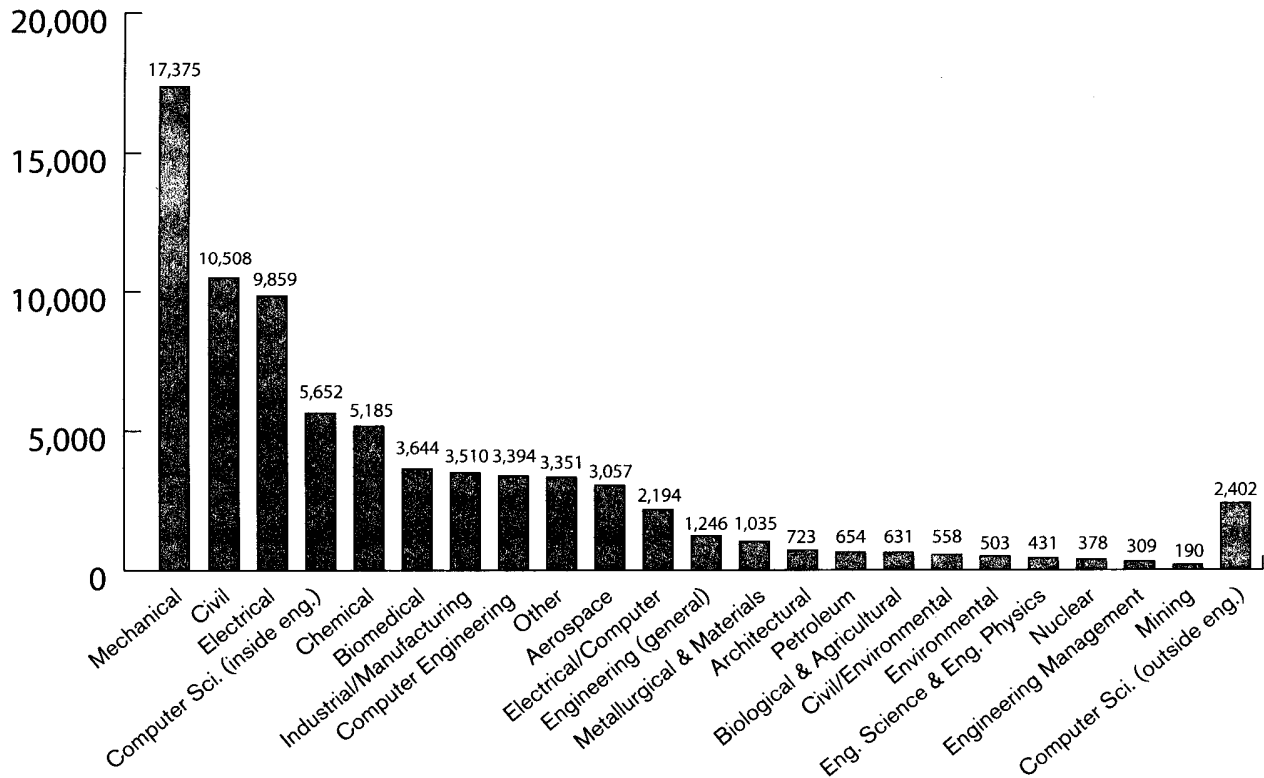
Some possible factors in selecting an Engineering discipline are listed below.

- Work experience in a related area
- Personal preference/strengths/aptitude
- Local employment opportunities
- Salary
- Nationwide demand for specific types of Engineers
- Engineering disciplines available at local universities
- Work environment

Starting salaries for recent graduates with Bachelor's degrees in Engineering are consistently quite high. The tables on the following page shows average starting salaries for specific Engineering disciplines.

To a large extent, the law of supply and demand seems to control how many potential Engineers enter each discipline. If jobs were not available in a particular area of Engineering, the number of students entering that discipline would certainly begin to decrease. The chart below indicates how many BS degrees in Engineering were awarded by discipline in 2010 (Source: Profiles of Engineering and Engineering Technology Colleges – ASEE 2010 Edition).

Bachelor's Degrees Awarded By Engineering Discipline in 2009-2010: 74,387



Engineering Salary by Discipline

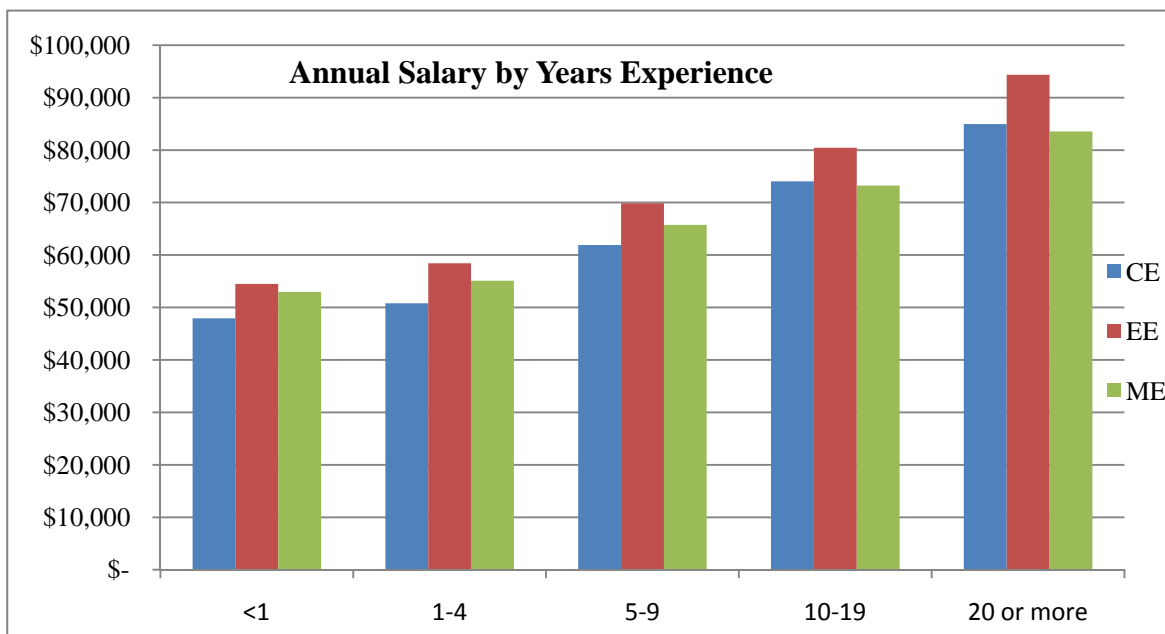
Discipline	Starting Salaries *	All levels of experience **
Aerospace (AE)	\$53,626	\$101,020
Biomedical (BI)	\$51,044	\$69,760
Chemical (CH)	\$59,218	\$91,040
Civil (CV)	\$48,998	\$76,760
Computer (CP)	\$55,920	\$89,640
Electrical (EE)	\$55,333	\$83,270
Environmental (EN)	\$47,914	\$74,980
Industrial (IN)	\$54,585	\$78,210
Materials (MT)	\$53,056	\$82,680
Mechanical (ME)	\$54,057	\$78,640
Nuclear (NU)	\$55,966	\$119,260
Petroleum (PT)		\$140,770

* Fall 2007 National Association of Colleges and Employers (NACE) Salary Survey (www.naceweb.org)

** May 2007 Bureau of Labor Statistics (www.bls.gov)

Engineering Salary by Length of Experience

Years Experience	CE	EE	ME
<1	\$47,930	\$54,482	\$52,965
1-4	\$50,803	\$58,420	\$55,096
5-9	\$61,885	\$69,871	\$65,748
10-19	\$74,025	\$80,443	\$73,256
20 or more	\$84,956	\$94,345	\$83,550



Source: www.PayScale.com (July 2008)

According to the 2007 NSPE Engineering Income & Salary Survey:

- The average annual salary for an engineer with less than one year of experience is \$49,250.
- The median annual salary for all engineers is \$81,316
- Petroleum engineers have the highest annual salary of \$119,500. The second highest were mining and forensic engineers at \$107,500. The third highest were nuclear engineers at \$106,000.
- The average annual salary of engineers with BS degrees is \$73,000.
- The average annual salary of engineers with MS degrees is \$82,558.
- The average annual salary of engineering with Ph.D degrees is \$94,000.
- The average annual salary of licensed Professional Engineers (PE's) is \$86,000, which is 24% higher than the salary for non-licensed engineers at \$69,355.

Engineering or Engineering Technology?

Students considering a major in Engineering should understand the difference between Engineering and Engineering Technology. Some colleges or universities, such as ODU, offer programs in both Engineering and Engineering Technology. Virginia Tech used to have both Engineering and Engineering Technology programs but eliminated their Engineering Technology programs in the 1980's. They now have only Engineering programs. ASEE reports that in 2007 there were:

- 338 colleges and universities offering BS degrees in Engineering
- 248 colleges and universities offering MS degrees in Engineering
- 191 colleges and universities offering PhD degrees in Engineering
- 93 colleges offering BS degrees in Engineering Technology

(Source: Profiles of Engineering and Engineering Technology Colleges – ASEE 2007 Edition).

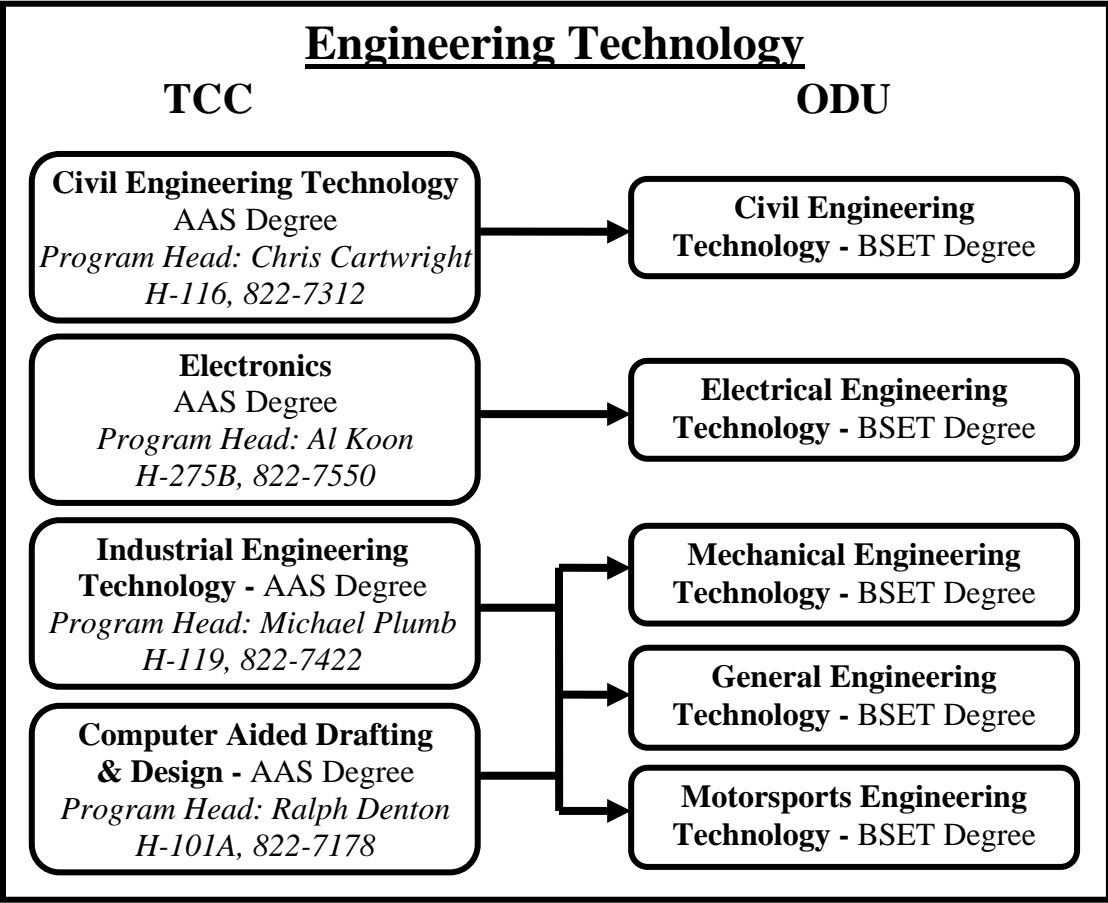
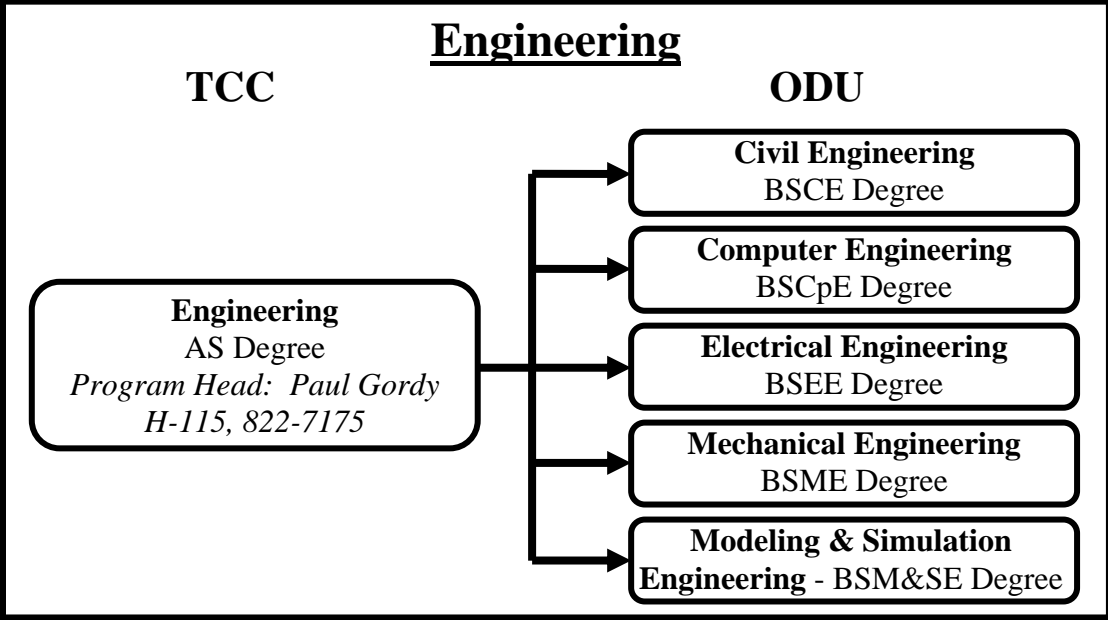
In general, Engineering is a more rigorous program mathematically, providing a better foundation for design work, research, and post-graduate study (Master's or Ph.D. degrees). Engineering graduates are typically offered higher salaries and will have a wider assortment of employment opportunities than Engineering Technology graduates. Engineers typically have the lead role in engineering projects such as new product development, engineering design work or analysis, production management, consulting, etc., whereas Engineering Technologists often work in more of an engineering support capacity.

In general, Engineering Technology is more "hands on" oriented and students in these curricula may spend much more time in lab courses than Engineering students. Engineering Technologists often work closely with Engineers, but in a supportive role such as in quality assurance, prototype model construction and testing, safety, reliability assessment, design modification, and production (although Engineers may work in these areas as well). Students majoring in Engineering Technology should realize that some companies will not hire graduates with Engineering Technology degrees (such as NASA) and hire only applicants with Engineering degrees for Engineering positions. Other companies make no distinction between the degrees. The federal government (Norfolk Naval Shipyard, NAVSEA, Naval Public Works, etc.) will often hire Engineering Technology graduates as engineers once they pass the Fundamentals of Engineering (FE) exam. Post-graduate programs in Engineering Technology are rare and Engineering Technology students are typically required to take many undergraduate math and engineering courses before they will be accepted into postgraduate Engineering programs.

Students sometimes have taken courses in Engineering Technology programs and wish to use the credits in an Engineering program. This is generally not possible. ABET accredits both Engineering and Engineering Technology programs nationwide and does not allow Engineering programs to give credit for Engineering Technology courses.

As stated previously, Virginia Tech offers only Engineering programs. ODU offers both Engineering programs (with 5 undergraduate degrees) and Engineering Technology programs (with 5 undergraduate degrees). The chart on the following page indicates how different curricula at TCC transfer to ODU.

Engineering and Engineering Technology
Transfer Relationship between TCC and ODU



ENGINEERING (831)

Associate in Science Degree: Engineering

<u>Pre-requisite (P)/</u> <u>Co-requisite (C)</u>	<u>Course</u> <u>Number</u>	<u>Course Title</u>	<u>Credits</u>	<u>When</u> <u>Taken</u>
FIRST SEMESTER				
C: MTH 4	CHM 111	College Chemistry I	4	_____
P: CHM 1 or HS Chem	EGR 120	Introduction to Engineering	2	_____
P: MTH 164 or 166	ENG 111	College Composition I	3	_____
Placement	HIS _____	History (HIS 101,102, 111,112,121, or 122)	3	_____
_____	MTH 173	Calculus with Analytic Geometry I	5	_____
Placement	SDV 101	Orientation to Engineering and Technologies	1	_____
_____		Total:	18	
SECOND SEMESTER				
P: CHM 111	CHM 112	College Chemistry II ****	4	_____
P: MTH 164 or 166	EGR 110	Engineering Graphics	3	_____
P: ENG 111	ENG 112 or	College Composition II or	3	_____
	ENG 131	Technical Report Writing ***		
P: MTH 173	MTH 174	Calculus with Analytic Geometry II	4	_____
_____	EGR	Approved Engineering Elective *	3	_____
		Total:	17	
THIRD SEMESTER				
P: EGR 110	EGR 125	Introduction to Engineering Methods (C++)	4	_____
or instructor perm.	EGR	Approved Engineering Elective *	3	_____
P: MTH 174	MTH 279	Ordinary Differential Equations	4	_____
P: MTH 173	PHY 241	University Physics I	4	_____
_____	_____	Social Science Elective **	3	_____
		Total:	18	
FOURTH SEMESTER				
_____	_____	Humanities Elective **	3	_____
_____	_____	Humanities Elective **	3	_____
P: MTH 174	MTH 277	Vector Calculus	4	_____
P: PHY 241	PHY 242	University Physics II	4	_____
_____	EGR	Approved Engineering Elective *	3	_____
_____	_____	Health, Physical Education or Recreation	1	_____
		Total:	18	
Total Minimum Credits for A.S.degree:			71	

Notes related to the A.S. degree in Engineering shown on the previous page

***Approved Engineering Electives** include the following courses (consult the Engineering Program Head for assistance in determining which courses are recommended for transfer into Civil Engineering, Mechanical Engineering, Electrical Engineering, etc.). A minimum of 9 credits of Approved Engineering Elective are required for the degree; however, additional courses may still be transferable.

- EGR 140 - Engineering Mechanics - Statics (3 cr, co-requisite MTH 174, pre-requisite EGR 120)
- EGR 245 - Engineering Mechanics - Dynamics (3 cr, pre-requisite EGR 140, pre-requisite MTH 174)
- EGR 246 - Mechanics of Materials (3 cr, pre-requisite EGR 140)
- EGR 247 - Mechanics of Materials Lab (1 cr, co-requisite EGR 246)
- EGR 260 - Circuit Analysis (3 cr, co-requisites MTH 279 and EGR 120)
- EGR 261 - Signals & Systems (3 cr, pre-requisites EGR 260 and MTH 279)
- EGR 262 - Fundamental Circuits Lab (2 cr, pre-requisites EGR 260 and EGR 125)
- EGR 267 - Engineering Analysis Tools (3 cr., co-requisite EGR 260)
- EGR 270 - Fundamentals of Computer Engineering (4 cr, pre-requisite EGR 125)

**** Social Science/Humanities Electives.**

Eligible courses are listed page 33 in the 2010-2011 catalog. Students should consult an academic advisor or counselor or the Engineering Program Head to choose the appropriate course(s). A table of general areas for each elective is provided below.

Social Science Electives	Humanities Electives
Economics -ECO	Art (history or appreciation only) - ART
Geography - GEO	Drama
History - HIS	Foreign Languages (not acceptable for ODU)
Political Science - PLS	Humanities – HUM
Psychology - PSY	Literature – ENG
Social Science - SOC	Music (history or appreciation only) – MUS
Sociology - SOC	Philosophy – PHI
	Religion - REL
	Theater (appreciation) – CST 141, 142, or 151

*** **ENG 112 is recommended for students transferring to Virginia Tech. ENG 131 is recommended for students transferring to ODU, although ENG 112 is acceptable.**

**** Virginia Tech no longer requires CHM 112 for any engineering majors except chemical engineering. TCC students planning to transfer to Virginia Tech may substitute any other 4 credits not being used for the AS degree in Engineering in place of CHM 112. See Paul Gordy in H-115 to complete an official substitution form.

TCC Computer Competency Requirement

Note that successful completion of the A.S. degree in Engineering satisfies the TCC Computer Competency Requirement. Engineering students do not need to take ITE 115.

Approved Engineering Electives

The TCC Engineering curriculum sheet on the previous two pages includes nine credits of “Approved Engineering Electives”. Students should select a **minimum** of nine credits of Engineering courses in order to satisfy this requirement. Factors to consider when selecting Approved Engineering Electives include:

- Students should pick courses that will allow them to transfer efficiently into the Engineering program of their choice at a 4-year college or university
- Students can sometimes benefit by taking more than nine credits of Approved Engineering Electives if all of the credits transfer

Since most TCC Engineering students transfer to either Old Dominion University or Virginia Tech, a table is provided below with recommended selections for Approved Engineering Electives. Additional transfer information for these institutions is provided later in this handbook.

Recommended Approved Engineering Electives (minimum of 9 required)

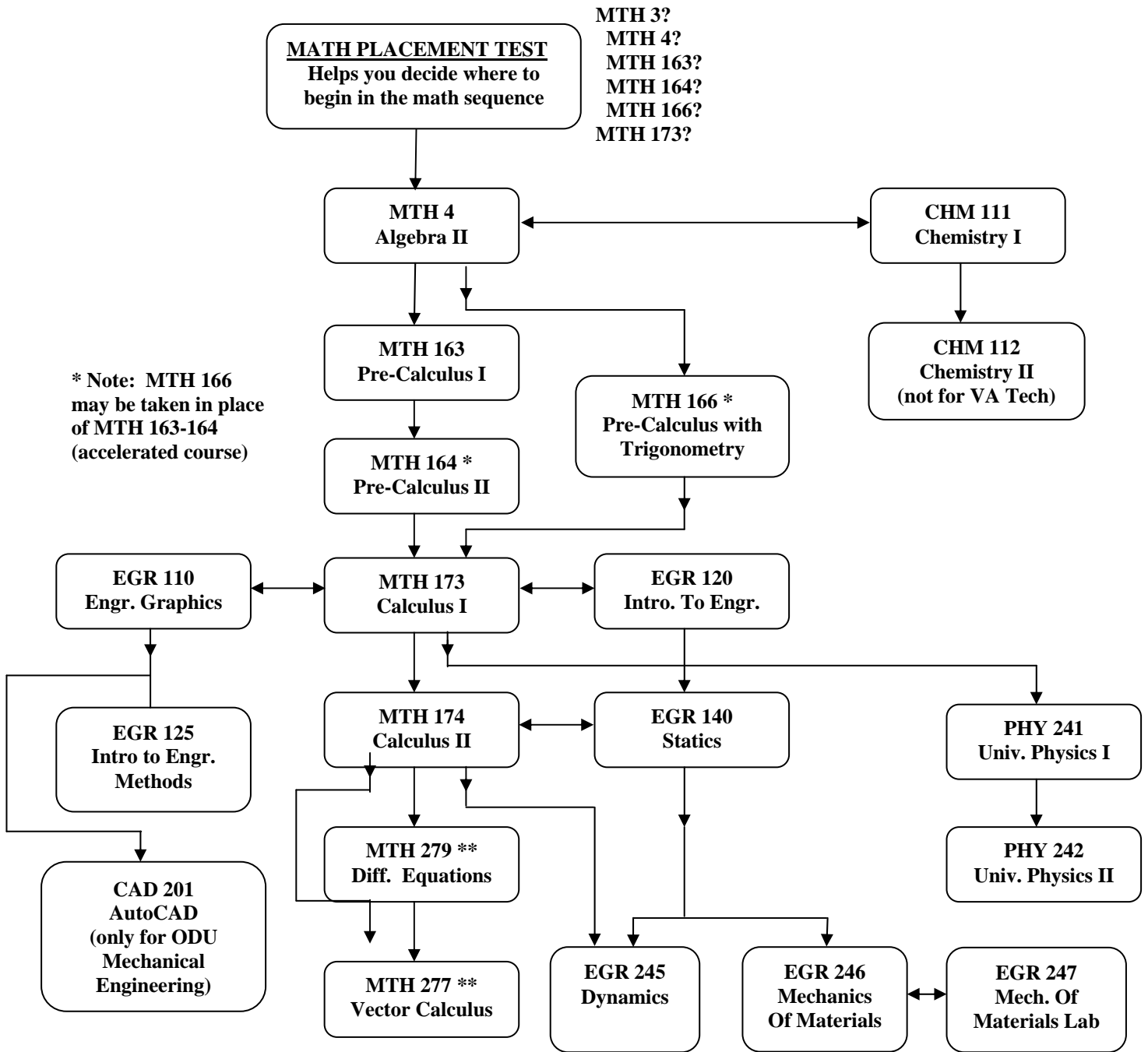
ODU Civil Engineering		ODU Mechanical Engineering		ODU Electrical Engineering		ODU Computer Engineering	
Electives	Cr	Electives	Cr	Electives	Cr	Electives	Cr
EGR 140	3	EGR 140	3	EGR 260	3	EGR 260	3
EGR 245	3	EGR 245	3	EGR 261	3	EGR 261	3
EGR 246	3	EGR 246	3	EGR 262	2	EGR 262	2
EGR 247	1	EGR 247	1	EGR 270	4	EGR 270	4
GOL 105 or BIO 101	4			EGR 267	3	EGR 267	3
GIS 200	4			EGR 140	3	CSC 210	4

VA Tech Chemical Engineering		VA Tech Civil Engineering		VA Tech Mechanical Engineering		VA Tech Electrical Engineering		VA Tech Computer Engineering		VA Tech All Others **	
Electives	Cr	Electives	Cr	Electives	Cr	Electives	Cr	Electives	Cr	Electives	Cr
EGR 140	3	EGR 140	3	EGR 140	3	EGR 140	3	EGR 140	3	EGR 140	3
EGR 246	3	EGR 245	3	EGR 245	3	EGR 260	3	EGR 260	3	EGR 245	3
CHM 241	3	EGR 246	3	EGR 246	3	EGR 261	3	EGR 261	3	EGR 246	3
CHM 245	1					EGR 270	4	EGR 270	4		

** Includes the following:

Aerospace Engineering
 Ocean Engineering
 Biological Systems Engineering
 Engineering Science & Mechanics
 Industrial & Systems Engineering
 Material Science
 Mining & Minerals Engineering

Flowchart of Technical Courses for Engineering Students Transferring into Civil or Mechanical Engineering



* Note: MTH 166 may be taken in place of MTH 163-164 (accelerated course)

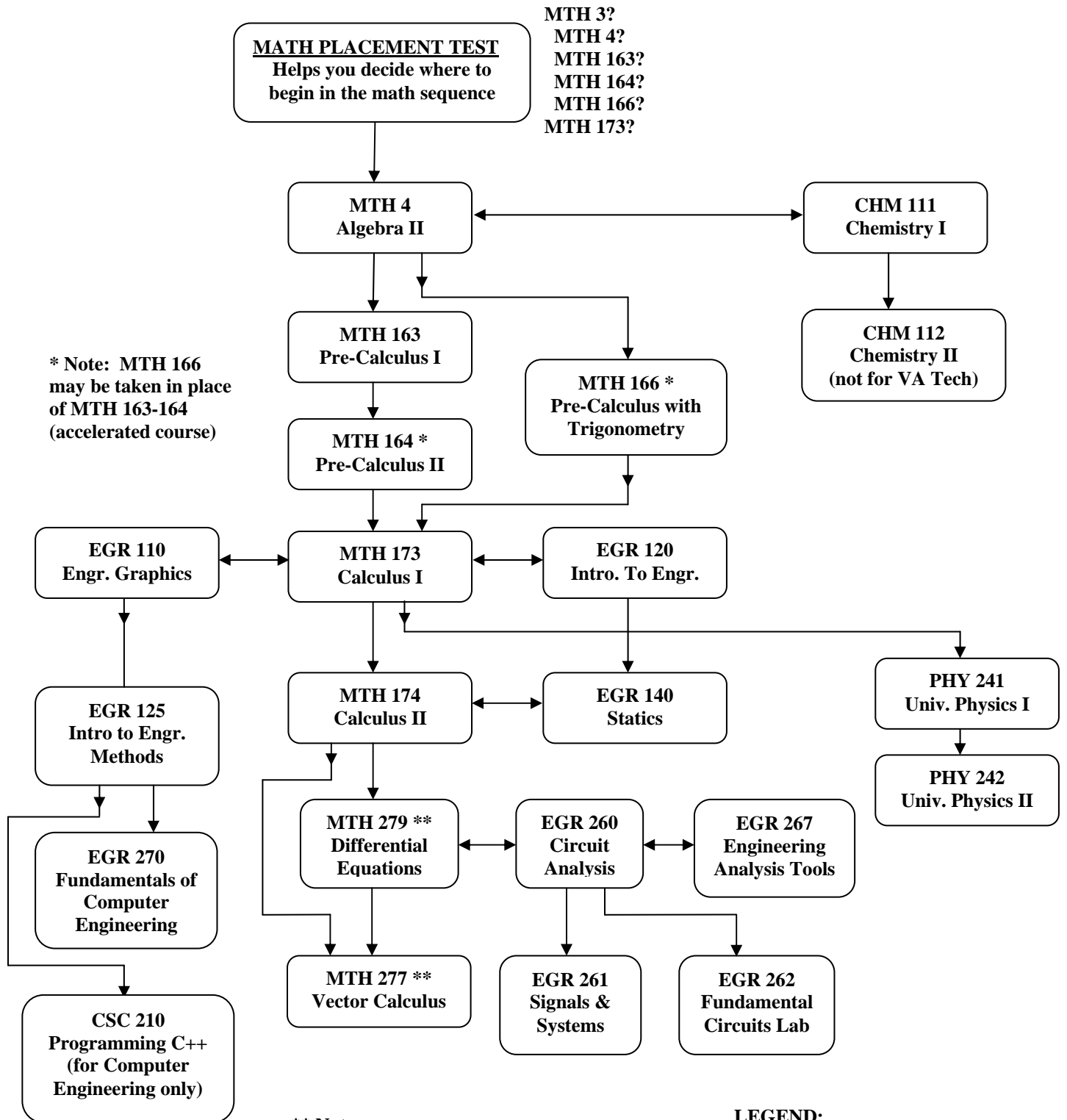
** Note: MTH 277 and MTH 279 can be taken in either order after MTH 174

LEGEND:

↓ Indicates a pre-requisite

↔ Indicates a co-requisite

Flowchart of Technical Courses for Engineering Students Transferring into Electrical or Computer Engineering



**** Notes:**

- A) MTH 277 and MTH 279 can be taken in either order after MTH 174
- B) MTH 277 not required for Computer Engineering at ODU

LEGEND:

- ↓ Indicates a pre-requisite
- ↔ Indicates a co-requisite

Tentative Annual Schedule of Engineering Courses (2011-2013)

Virginia Beach Campus:

Fall 2011 and Fall 2012

	<u>Time</u>
EGR 110 - Engineering Graphics	D/E
EGR 120 - Introduction to Engineering	D/E/H
EGR 125 - Introduction to Engineering Methods (C++)	D/E
EGR 140 - Engineering Mechanics - Statics	D/E
EGR 218 – Introduction to Modeling & Simulation	D
EGR 245 - Engineering Mechanics - Dynamics	D
EGR 246 - Mechanics of Materials	D
EGR 247 - Mechanics of Materials Laboratory	D
EGR 260 - Circuit Analysis	E
EGR 261 – Signals & Systems	D
EGR 267 – Engineering Analysis Tools	E

Spring 2012 and Spring 2013

EGR 110 - Engineering Graphics	D/E
EGR 120 - Introduction to Engineering	D/E/H
EGR 125 - Introduction to Engineering Methods (C++)	D/E
EGR 140 - Engineering Mechanics - Statics	D/E
EGR 230 – Discrete Event Simulation	D
EGR 245 - Engineering Mechanics - Dynamics	E
EGR 246 - Mechanics of Materials	E
EGR 247 - Mechanics of Materials Laboratory	E
EGR 260 - Circuit Analysis	D
EGR 261 – Signals & Systems	E
EGR 262 – Fundamental Circuits Lab	D
EGR 267 – Engineering Analysis Tools	D
EGR 270 – Fundamentals of Computer Engineering	E

Summer 2012 and Summer 2013

EGR 110 - Engineering Graphics	D/E
EGR 120 - Introduction to Engineering	D/E
EGR 125 - Introduction to Engineering Methods (C++)	E
EGR 140 - Engineering Mechanics - Statics	E
EGR 245 - Engineering Mechanics - Dynamics	E
EGR 262 – Fundamental Circuits Lab	E
EGR 270 – Fundamentals of Computer Engineering	E

Key:

D - denotes a daytime class meeting between 8:00 - 4:00 p.m.

E - denotes an evening class meeting between 4:00 - 9:55 p.m.

H - denotes hybrid class (mostly internet-based class with some required meetings on campus)

Chesapeake Campus: An annual schedule has not been developed yet, but it is anticipated that the following courses will be available on a regular basis: EGR 110, 120, 126, 140, 245, 246, and 247. Contact Steve Ezzell at SEzzell@tcc.edu for more information.

Tri-Cities Center: Most EGR courses offered at Tri-Cities are at the request of Hunting-Ingalls Industry (formerly Northrup Grumman Newport News). As a result, it is difficult to predict which courses will be offered on a given semester. However, the following courses will be offered occasionally: EGR 110, 120, 126, 140, 245, 246, 247, 270.

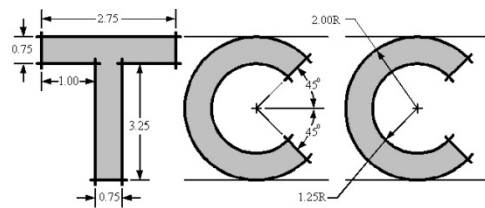
Scholarships

The following scholarships are available for engineering students. See the Engineering Program Head for additional information.

Name of Scholarship	General Information and Requirements	Amount	Deadline
Michael J. French, Jr. Memorial Engineering Scholarship	Michael J. French, Jr. was the President of the TCC Engineering Club during the 2001-2002 academic year and died of leukemia in 2004. The TCC Engineering Club has established this scholarship in his memory. More information and applications are available at http://www.tcc.edu/faculty/webpages/PGordy/MJFScholarship/ Minimum GPA 3.0 Must have completed MTH 173 and EGR 120 or equiv. Apply through TCC Financial Aid Office (no FAFSA required)	\$750 minimum	April 15
Virginia Space Grant Scholarship	This scholarship is given to encourage talented Virginia Community College students to pursue studies in technical fields, engineering, and the sciences. Awards are generally made for full-time students although part time students are also eligible. Minimum GPA 3.0	\$1500/yr	Feb 15
Society for Women Engineers Scholarship	The Hamton Roads Section of SWE awards scholarships for women enrolled in engineering transfer programs.	\$500	Dec 1 and June 1
Leo Padis Scholarship	This scholarship is available only for students completing the A.S. degree in Engineering from a Virginia Community College. Merit based. Several scholarships awarded annually.	\$1000	June 1
Departmental Scholarships	The ODU Civil and Environmental Engineering Department offers a scholarship for transfer students. Contact the department for additional information. Other engineering departments may also offer departmental scholarships.	varies	when transferring
Other Scholarships	Scholarships are often available through engineering societies, military-related organizations, credit unions, and other organizations.	varies	varies



**National Society of
Professional Engineers®**



ENGINEERING

TCC Engineering Club

The TCC Engineering Club is a student chapter of the National Society of Professional Engineers (NSPE). Participation in club activities can greatly enhance the educational experience for Engineering students. Club activities include:

- Field Trips to local business/industry
- Engineering speakers from business/industry
- Presentations by 4-year Engineering colleges
- National Engineers Week activities
- Social activities
- Regular meetings
- Design contests
- Service projects

The TCC Engineering Club also offers students leadership opportunity. Club officers and committee members are involved in planning field trips, speakers, contests, and more. Meetings are generally scheduled on the 1st and 3rd Tuesday of each month from 12:30 to 1:30 in room H-160 (Advanced Technology Center) during the Fall and Spring semesters.

Club Blackboard Site

The TCC Engineering Club has a Blackboard site. If you join the site you will receive emails about upcoming club activities and will have access to club projects, job postings, scholarship information, photos from club events, etc. To join the club Blackboard site, send an email to any club officer or to Paul Gordy, Engineering Club Advisor, at PGordy@tcc.edu.



Virginia Power Field Trip



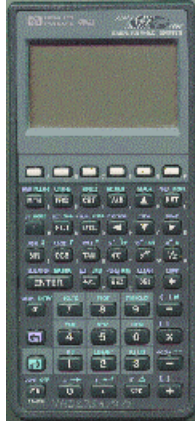
Rosemont Road Cleanup



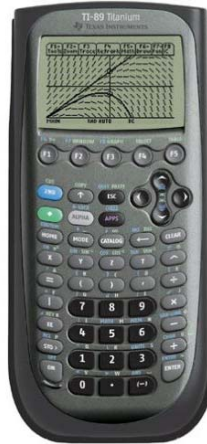
ASEE Battery-Powered Car Competition

Calculator Requirement for Engineering Students

Calculators have become increasingly powerful in recent years. In order to insure that one student does not have an advantage over another during a test simply due to the calculator being used, Engineering students are required to have one of the following calculators:



- TI - 85
- TI - 86
- TI - 89
- TI - 92
- TI Voyage 200
- TI NSpire CAS
- HP - 48G
- HP - 48GX
- HP - 49
- HP - 50



Instructors will not actually check to see what type of calculator that the students are using. However, students should realize that they may be at a disadvantage to other students on a test if they have a calculator with lesser capabilities. Some of the features which separate these calculators from others are listed below:

- Solution of simultaneous equations (including complex coefficients)
- Vector operations (such as dot and cross products)
- Determination of roots of polynomials
- Algebraic operations involving complex numbers
- Regression analysis and curve fitting
- Unit conversions
- Graphing
- Programming capabilities
- Symbolic Calculations

Computer Recommendation for Engineering Students

TCC Engineering students are not required to own computers. Computer labs are available in various locations on campus for student use (H-151 and H-209 in the ATC have most of the engineering software). Nearly all Engineering courses do require significant computer use and many students find it to be a great convenience to have their own computers.



TCC Computer Competency Requirement

TCC requires that all graduates should be able to demonstrate computer competency in some basic areas, including word-processing, spreadsheets, data base operations, and internet/email use. **Engineering students are automatically exempt from this requirement** due to the significant computer content in all Engineering courses. Engineering graduates are some of the most computer-competent graduates. Software taught and used in TCC Engineering courses includes C++, MATLAB, EXCEL, Autodesk Inventor, PSPICE, and more.

Transfer Options for TCC Engineering Students in Virginia

TCC is accredited by the Southern Association of Colleges and Schools (SACS). As a result, TCC students are able to easily transfer credits to other colleges nationwide. Listed below are Engineering programs in Virginia which students may want to consider for continuing their Engineering education. Each college or university sets their own transfer requirements, so students should contact the college of their choice early in their program to check on transfer details. Since most TCC Engineering students transfer to either Old Dominion University or Virginia Tech, detailed transfer information is provided in this booklet for their Engineering programs.

College or University	Engineering programs offered	Comments
Old Dominion University	Civil Engineering Computer Engineering Electrical Engineering Mechanical Engineering Modeling & Simulation Engineering	Guaranteed acceptance with 2.5 GPA Foreign Language requirement waived and General Education requirements automatically met by the AS degree in Engineering.
Virginia Tech	Aerospace Engineering Biological Systems Engineering Chemical Engineering Civil Engineering Computer Engineering Electrical Engineering Engineering Science & Mechanics Industrial & Systems Engineering Material Science Mechanical Engineering Mining & Minerals Engineering Ocean Engineering	Guaranteed acceptance with 3.0 GPA and completion of A.S. degree. The articulation agreement is available online at: http://myfuture.vccs.edu/Portals/0/ContentAreas/AcademicServices/VCCS_VT.pdf Additional requirement may be added soon requiring grades of B or better in all technical courses.
Christopher Newport Univ.	Computer Engineering	3.0 GPA
Hampton University	Chemical Engineering Electrical Engineering	Private University so more expensive Only Chemical Engineering program in the Tidewater area
George Mason University	BioEngineering Civil & Environmental Engineering Electrical Engineering Systems Engineering Operations Research Urban Systems Engineering	2.5 GPA required for transfer
Virginia Commonwealth University	Chemical Engineering Electrical Engineering Mechanical Engineering	3.0 GPA
University of Virginia	Aerospace Engineering Applied Mechanics Chemical Engineering Civil Engineering Electrical Engineering Engineering Science Nuclear Engineering Systems Engineering	Guaranteed admission to all engineering programs with 3.4 GPA and completion of A.S. degree. The articulation agreement is available online at: www.virginia.edu/undergradadmission/docs/agreement.doc Students may also apply for UVA's PRODUCED in VA engineering program – see next page for details. Note: Likely admission with 3.2 GPA.
James Madison University	General Engineering	3.0 GPA
Virginia Military Institute	Civil & Environmental Engineering Electrical Engineering Mechanical Engineering	Minimum 2.0 GPA for transfer Must be 22 years old or younger

UVA PRODUCED in Virginia Program



Earn a BS degree in Engineering Science from UVA without leaving Tidewater!

The following is an excerpt from UVA's web page:

***Engineers PRODUCED in Virginia** (Providing Undergraduate Connections to Engineering Education in Virginia) is an academic outreach initiative of the U.Va. School of Engineering and Applied Science, in partnership with the Virginia Community College System. Through this program, the Engineering School is reaching out to bring undergraduate engineering education to communities throughout Virginia. The program is currently available to students studying engineering at the following Virginia community colleges: Central Virginia, Danville, J. Sargeant Reynolds, New River, Northern Virginia, Southwest Virginia, Thomas Nelson, **Tidewater**, and Virginia Western.*

The PRODUCED program is also in the process of expanding to the service regions of these additional Virginia community colleges: Blue Ridge, Germanna, John Tyler, Mountain Empire, Patrick Henry, Piedmont Virginia, Southside Virginia, Virginia Highlands, and Wytheville.

*Through the PRODUCED program, students can earn an Associate of Science in Engineering degree (or equivalent) from their local community college and then a Bachelor of Science degree in Engineering Science from the University of Virginia, **all without leaving their communities**. That is, by enrolling in their local, participating community college, students can take the first steps towards becoming an undergraduate engineering student at the University of Virginia and ultimately earning their Bachelor of Science degree in engineering from U.Va. No travel to Charlottesville is necessary to take classes in the U.Va. portion of the PRODUCED program.*

For more information about the Engineers PRODUCED in Virginia program, browse this site or contact James Groves, Engineering School assistant dean for research and outreach, at 434.924.6261 or jgroves@virginia.edu.

Be sure to visit their website!

UVA PRODUCED in Virginia Program:

<http://www.seas.virginia.edu/acad/programs/producedinva/>

Notes:

- 1) Students graduating from TCC with an AS degree in Engineering have two options:
 - A) Transfer to UVA (and move to UVA) and earn a BS degree in Electrical Engineering, Mechanical Engineering, etc (8 possible engineering disciplines)
 - B) Stay in your local community and earn a BS degree in Engineering Science online.
- 2) Both options above require a 3.4 GPA (although a slightly lower GPA will be considered)

Old Dominion University Transfer Information

Admission:

Students should apply online at: www.odu.edu

The deadlines for transfer admission are as follows:

Fall or Summer admission: February 15 recommended, but check www.odu.edu

Spring admission: October 1

Students must indicate on their application which degree program they wish to pursue. Students who complete their A.S. degree in Engineering from TCC with a minimum GPA of 2.5 are automatically accepted into the Engineering department of their choice. Transfer credit will only be given for courses in which the student received a grade of C or better. Official copies of TCC transcripts must be sent at the time of application and again once all coursework at TCC has been completed. Engineering department personnel generally will not counsel students or provide specific transfer information until the student has applied for admission to ODU.

Notes:

- 1) Many TCC students transfer to ODU *before* completing their A.S. degree (often taking courses at both colleges in the same semester). If this occurs, simply let your ODU advisor know that you plan to complete the A.S. degree and your records will be evaluated such that you will receive the benefits of completing the degree.
- 2) Once you have been accepted, contact the departmental advisor for an appointment. Do not wait until the Preview session for transfer students. It is important to register as soon as possible in order to get into the engineering classes that you need.

General Information for all Engineering Programs at ODU:

1. ODU offers five engineering degree programs (also shown in the chart on page 6):
Electrical Engineering Civil Engineering Mechanical Engineering
Computer Engineering Modeling & Simulation Engineering
2. There are at least three significant advantages to completing the A.S. degree in Engineering at TCC before transferring to ODU:
 - A) The foreign language requirement is waived *if the student completes* the A.S. degree in Engineering from TCC.
 - B) Scholarships are sometimes available for transfer students *if the student completes* the A.S. degree in Engineering.
 - C) The lower-level General Education requirements at ODU are automatically met *if the student completes* the A.S. degree in Engineering from TCC. This gives the student great flexibility in that general education courses transfer as a block and do not need to match on a course-by-course basis. This is illustrated in the diagram shown below.

TCC General Education Courses		⇒	ODU General Education Courses	
Course	Cr.		Course	Cr.
History Elective	3	Interpreting the Past	3	
Social Science Elective	3	Human Behavior	3	
Humanities Science Elective	3	Human Creativity	3	
Humanities Science Elective	3	Literature	3	
Total Credits:	12	Total Credits:	12	

ODU Electrical Engineering Transfer Information

1. Once you have applied and received a letter of acceptance contact the Electrical and Computer Engineering (ECE) office at 683-3741 for an appointment for transcript evaluation, registration, and questions.
2. See the ODU Electrical Engineering Curriculum Worksheet on the following page.
3. The Electrical Engineering curriculum at ODU contains 5 sophomore-level electrical/computer engineering courses and students should have all 5 of these courses in order to move smoothly into the junior-level electrical engineering courses. All 5 of these courses can be taken at TCC as indicated by the chart below. Be sure to check the annual schedule on page 11 since each course is not offered every semester at TCC.

TCC Course Number and Title	TCC Credits	ODU Course Number	ODU Credits
EGR 260 Circuit Analysis	3	ECE 201	3
EGR 261 Signals & Systems	3	ECE 202	3
EGR 262 Fundamental Circuits Lab	2	ECE 287	2
EGR 270 Fundamentals of Computer Engineering	4	ECE 241	4
EGR 267 Engineering Analysis Tools	3	ECE 200	3

4. Take EGR 140 – Statics as it transfers to ODU as a required non-major Engineering elective.

Overall Recommendation:

1. Take the 5 electrical courses listed above as **Approved Engineering Electives** at TCC (although a minimum of only 9 credits are needed for the A.S. degree at TCC).
2. Complete the A.S. degree in Engineering at TCC.
3. Take EGR 140 – Statics for additional transfer credit.

Be sure to visit their website!

ODU Electrical & Computer Engineering Home Page: http://eng.odu.edu/ece/

ODU Electrical Engineering Transfer Worksheet (Unofficial)
(BSEE Degree)

ODU Course #	ODU Course Title	Cr	√	Transfer Credit from TCC
ENGL 110C	English Composition	3		ENG 111
MATH 211	Calculus I	4		MTH 173
CHEM 121N/122N	Chemistry I and Chemistry Lab	4		CHM 111
ENGN 110	Engineering & Tech I	2		EGR 120
COMM 101R	Public Speaking	3		
MATH 212	Calculus II	4		MTH 174
CS 150	Intro to Programming	4		EGR 125
CHEM 123N	Chemistry II	3		CHM 112
PHYS 231N	University Physics I	4		PHY 241
ECE 111	Information Literacy for ECE	2		EGR 110
ECE 201	Circuit Analysis	3		EGR 260
ECE 200	Engineering Analysis Tools	3		EGR 267
MATH 307(280)	Differential Equations	3		MTH 279
PHYS 232N	University Physics II	4		PHY 242
ECE 241	Fund of Computer Engineering	4		EGR 270
ECE 202	Circuits, Signals & Linear Sys.	3		EGR 261
ECE 287	Circuits Lab	2		EGR 262
Engr	Non-major Engr Elective	3		EGR 140
MATH 312 (285)	Calculus III	4		MTH 277
GEN ED	Human Creativity	3		A. S. Degree *
ECE 303	Electrical Power	3		
ECE 313	Electronic Circuits	4		
ECE 332	Micro. Materials & Processes	3		
ECE 381	Discrete Time Signal Processing	3		
GEN ED	History	3		A. S. Degree *
ECE 304	Probability, Statistics & Reliability	3		
ECE 387	Microelec. Fabrication Lab	3		
ENGL 231C	Technical Writing	3		ENG 131
GEN ED	Literature	3		
ECE 323	Electromagnetics	3		
ECE 485W	EE Design I	3		
ECE 486	Prep ECE Design II	1		
ECE 4XX	Technical Elective 1	3		
ECE 4XX	Technical Elective 2	3		
Depth	Upper Division Cluster or Minor	3		
ENMA 480	Engineering Ethics	3		A. S. Degree *
ECE 487	ECE Design II	2		
ECE 4XX	Technical Elective 3	3		
ECE 4XX	Technical Elective 4	3		
ENGN 401	FE Exam Review	1		
GEN ED	Human Behavior	3		A. S. Degree *
Depth	Upper Division Cluster or Minor	3		

Total credits in B.S. degree: 127

Max Total Transfer Credits: 74

Note: The ODU Foreign Language Requirement is waived if the A. S. Degree has been completed.

* If the A.S. Degree is completed, the 15 credits of TCC General Education requirements transfer as a block to cover the 15 credits of ODU General Education requirements (see chart on page 16).

ODU Computer Engineering Transfer Information

- Once you have applied and received a letter of acceptance, contact the Electrical and Computer Engineering (ECE) office at 683-3741 for an appointment for transcript evaluation, registration, and questions.
- See the ODU Computer Engineering Curriculum Worksheet on the following page.
- The Computer Engineering curriculum at ODU contains 5 sophomore-level electrical/computer engineering courses and students should have all 5 of these courses in order to move smoothly into the junior-level electrical engineering courses. All 5 of these courses can be taken at TCC as indicated by the chart below. Be sure to check the annual schedule on page 11 since each course is not offered every semester at TCC.

TCC Course Number and Title	TCC Credits	ODU Course Number	ODU Credits
EGR 260 Circuit Analysis	3	ECE 201	3
EGR 261 Signals & Systems	3	ECE 202	3
EGR 262 Fundamental Circuits Lab	2	ECE 287	2
EGR 270 Fundamentals of Computer Engineering	4	ECE 241	4
EGR 267 Engineering Analysis Tools	3	ECE 200	3

- The Computer Engineering program at ODU requires 2 computer science courses (based on the language C++). These 2 courses can be taken at TCC as indicated by the chart below.

TCC Course Number and Title	TCC Credits	ODU Course Number	ODU Credits
EGR 125 Intro to Engineering Methods or CSC 201 Computer Science I	4	CS 150	4
CSC 210 Programming C++	4	CS 250	4

Note: Some students take CSC 110 before CSC 201 if they would like a slower introduction into programming concepts using C++. CSC 110 at TCC is equivalent to CSC 148 at ODU, but these courses are not required.

- The Computer Engineering program is the only Engineering program at ODU does not require TCC's MTH 277. It is recommended that you substitute CSC 210 in place of MTH 277 for graduation purposes at TCC. A waiver is required for this substitution. See Paul Gordy in H-115 for the waiver.
- Note that the BS in Computer Engineering automatically satisfies the requirement for a minor in Computer Science.

Overall Recommendation:

- Take the 5 Electrical/Computer Engineering courses listed in the first table above as **Approved Engineering Electives** at TCC (although a minimum of only 9 credits are needed for the A.S. degree at TCC).
- Take the 2 Engineering/Computer Science courses listed in the second table above.
- Do not take MTH 277 at TCC (obtain a waiver to replace it with CSC 210 or with additional Approved Engineering Electives).
- Complete the A.S. degree in Engineering at TCC.

Be sure to visit their website!

ODU Electrical & Computer Engineering Home Page: <http://eng.odu.edu/ece/>

ODU Computer Engineering Transfer Worksheet (Unofficial)
(BSCpE Degree)

ODU Course #	ODU Course Title	Cr	√	Transfer Credit from TCC
ENGL 110C	English Composition	3		ENG 111
MATH 211	Calculus I	4		MTH 173
CHEM 121N/122N	Chemistry I and Chemistry Lab	4		CHM 111
ENGN 110	Engineering & Tech I	2		EGR 120
COMM 101R	Public Speaking	3		
MATH 212	Calculus II	4		MTH 174
CS 150	Intro to Programming	4		EGR 125
CHEM 123	Chemistry II	3		CHM 112
PHYS 231N	University Physics I	4		PHY 241
ECE 111	Information Literacy for ECE	2		EGR 110
ECE 201	Circuit Analysis	3		EGR 260
PHYS 232N	University Physics II	4		PHY 242
ECE 200	Engineering Analysis Tools	3		EGR 267
MATH 307 (280)	Differential Equations	3		MTH 279
ECE 241	Fund of Computer Engineering	4		EGR 270
ECE 202	Circuits, Signals & Linear Sys.	3		EGR 261
ECE 287	Circuits Lab	2		EGR 262
CS 381	Discrete Structures	3		
CS 250	Problem Solving & Programming	4		CS 210
CS 252	Intro to UNIX	1		
ENGL 231C	Technical Writing	3		ENG 131
ECE 313	Electronic Circuits	4		
GEN ED	Literature	3		A. S. Degree *
ECE 341	Digital System Design	3		
CS 361	Adv. Data Structures	3		
ECE 381	Discrete Time Signal Processing	3		
ECE 304	Probability, Statistics & Reliability	3		
ECE 346	Microcontrollers	3		
CS 350	Software Engineering	3		
GEN ED	Human Creativity	3		A. S. Degree *
ECE 3xx	Technical Elective 1	3		
ECE 484W	CMEN Design I	3		
ECE 443	Computer Architecture	3		
ECE 486	Prep ECE Design II	1		
ECE 4xx	Technical Elective 2	3		
GEN ED	History	3		A. S. Degree *
ENMA 480	Engineering Ethics	3		
ECE 487	ECE Design II	2		
CS 471	Operating Systems	3		
ENGN 401	FE Exam Review	1		
ECE 4xx	Technical Elective 3	3		
GEN ED	Human Creativity	3		A. S. Degree *
ECE 4xx	Technical Elective 4	3		

Total credits in B.S. degree: 128

Max Total Transfer Credits: 71

Note: The ODU Foreign Language Requirement is waived if the A. S. Degree has been completed.

* If the A.S. Degree is completed, the 15 credits of TCC General Education requirements transfer as a block to cover the 15 credits of ODU General Education requirements (see chart on page 16).

ODU Mechanical Engineering

Transfer Information

1. Once you have applied and received a letter of acceptance, contact the Academic Advisor for Mechanical Engineering and Mechanics (MEM), at 683-6363, for an appointment for transcript evaluation, registration, and questions.
2. See the ODU Mechanical Engineering Curriculum Worksheet on the following page.
3. Students transferring to ODU can take CAD 201 (AutoCAD) for additional transfer credit beyond the A.S. degree in Engineering. CAD 201 (4 cr) will transfer to ODU as MET 120 – Computer Aided Engineering Graphics as shown on the transfer worksheet on the following page. Note that EGR 110 is a pre-requisite to CAD 201.
4. Students transferring to ODU will lack MEM 201 and MEM 203 (Material Science and Lab), but these courses are not prerequisites for most junior level courses and can easily fit into your schedule at some point once you transfer to ODU.

Overall Recommendation:

1. Take EGR 140, EGR 245, EGR 246, and EGR 247 at **Approved Engineering Electives** at TCC.
2. Complete the A.S. degree in Engineering at TCC.
3. Take CAD201 for additional transfer credit.

Be sure to visit their website!

ODU Mechanical Engineering Home Page: <http://eng.odu.edu/me/>

ODU Mechanical Engineering Transfer Worksheet (Unofficial)
(BSME Degree)

ODU Course #	ODU Course Title	Cr	√	Transfer Credit from TCC
ENGN 110	Freshmen Engr. & Technology I	2		EGR 120
MATH 211	Calculus I	4		MTH 173
CHEM 121N/122N	Chemistry I and Chemistry Lab	4		CHM 111
ENGL 110C	English Composition	3		ENG 111
GEN ED	Human Creativity	3		A. S. Degree *
CHEM 123N	Chemistry II	3		CHM 112
MATH 212	Calculus II	4		MTH 174
CS 150	Problem Solving & Programming I	4		EGR 125
PHYS 231N	University Physics I	4		PHY 241
MAE 111	Information Literacy & Research	2		EGR 110
MET 120	Computer Aided Drafting	3		CAD 201
MAE 201	Material Science	3		
MAE 203	ME Lab 1 - Materials	1		
MAE 204	Statics	3		EGR 140
PHYS 232N	University Physics II	4		PHY 242
MATH 312 (285)	Calculus III	4		MTH 277
MAE 205	Dynamics	3		EGR 245
MAE 220	Egr. Mech. II - Solid Mechanics	3		EGR 246
MAE 225	ME Lab II - Solid Mechanics	1		EGR 247
MATH 307 (280)	Differential Equations	3		MTH 279
ENGL 231C	Technical Writing	3		ENG 131
GEN ED	Interpreting the Past	3		A. S. Degree *
MAE 311	Thermodynamics I	3		
MAE 303	Fluid Mechanics	3		
MAE 305	ME Lab III - Thermo/Fluids	1		
MAE 340	Computational Methods in ME	3		
GEN ED	Gen. Ed. Human Creativity	3		A. S. Degree *
GEN ED	Gen. Ed. Literature	3		A. S. Degree *
MAE 312	Thermodynamics II	3		
MAE 332	Mechanical Engineering Design I	3		
MAE 315	Heat and Mass Transfer	3		
ENGN 401	Fund. of Engineering (FE) Review	1		
GEN ED	Gen. Ed. Human Behavior	3		
ENMA 480	Ethics & Philosophy in Engineering	3		
MAE 434W	Project Design and Management I	3		
MAE 433	Mechanical Engineering Design II	3		
MAE 436	Dynamic Systems and Control	3		
MAE Option	ME Option ** Senior Elective	3		
GEN ED	Upper Division/Cluster	3		
MAE 435W	Project Design and Management II	3		
MAE Option	ME Option ** Senior Elective	3		
MAE Option	ME Option ** Senior Elective	3		
GEN ED	Upper level cluster/minor	3		

Total credits in B.S. degree: 126 Max Total Transfer Credits: 72

Note: The ODU Foreign Language Requirement is waived if the A. S. Degree has been completed.

* If the A.S. Degree is completed, the 15 credits of TCC General Education requirements transfer as a block to cover the 15 credits of ODU General Education requirements (see chart on page 16).

** ME students must declare 1 of 2 possible options or declare a minor before taking ME Options. See next page.

Options and Minors for Mechanical Engineering Students

Upon completion of the first semester of the junior year, ODU Mechanical Engineering students must pick one of the two options or specializations shown below. Note on the previous page that several senior courses are listed as "ME Option". Those courses must be chosen from the list of courses provided below for the option selected. Additional restrictions may apply.

Option in Power/Energy

MEM 411	Power Systems
MEM 412	Environmental Control
MEM 413	Energy Conversion
MEM 414	Gas Dynamics
ME/AE 417	Propulsion Systems
MEM 438	Control Systems Design & Application
ME 440	Introduction to Finite Element Analysis

Option in Mechanical Systems/Design

MEM 441	CAD of Mechanical Systems
MEM 431	Mechanisms
MEM 404	Vibrations
MEM 438	Control Systems Design & Application
MEM 440	Introduction to Finite Element Analysis

ODU Mechanical Engineering students used to be able to select a third option in Aerospace Engineering, but this can now be achieved by selecting a minor in that area. Note that ODU offers graduate degrees in Aerospace Engineering, but not a BS degree. However, ODU has added a minor in Aerospace Engineering as well as a minor in Motor Sports Engineering.

Minor in Aerospace Engineering

The Minor in Aerospace Engineering addresses four classical areas relevant to the design of aerospace vehicles - aerodynamics, flight mechanics, propulsion, and structures. Students are exposed to contemporary analysis and simulation software and benefit from access to an array of experimental facilities both on-campus and at the Langley Full-Scale Tunnel. Courses are designed such that undergraduates in Mechanical Engineering typically meet all prerequisites. Students in Mechanical Engineering Technology or other areas may have to take additional preparatory courses.

Minor in Motorsports Engineering

The **Minor in Motorsports Engineering** addresses four key areas relevant to high-performance vehicles - aerodynamics, engines, vehicle dynamics, and overall vehicle performance. Students use a unique array of laboratory facilities including the Langley Full-Scale Tunnel, engine dynamometers, and a Legends race car. Field trips to a local skid pad and race tracks for live vehicle testing are organized depending on the availability of these resources. Courses are designed such that the prerequisites are met by Mechanical Engineering or Mechanical Engineering Technology students.

Reference: ODU Mechanical Engineering Student Handbook and website.

ODU Civil Engineering Transfer Information

ODU has discontinued its BS in Environmental Engineering and made some changes to their BS in Civil Engineering degree. An overwhelming number of their civil/environmental students were selecting the more general Civil Engineering degree over the more specialized Environmental Engineering degree (which also matched employment trends). ODU points out that students can still specialize in the environmental area by selecting related electives in this area. Students can also continue for MS or PhD degrees in either Civil or Environmental Engineering. Note ODU's approach is that same approach found at many universities, including Virginia Tech.

The Civil Engineering program at ODU allows students to specialize in various disciplines within Civil Engineering, including:

- Geotechnical
- Structural
- Water Resources
- Environmental
- Transportation

Specific information for students planning to transfer into Civil Engineering at ODU is shown below.

1. Once you have applied and received a letter of acceptance, contact Dr. Schafran, Civil and Environmental Engineering Department Chairman, at 683-3753 for an appointment for transcript evaluation, registration, and questions.
2. ODU does not require EGR 247 (Mechanics of Materials Lab) for the Civil Engineering program, but TCC Engineering faculty recommend that students take it anyway. Taking the lab (EGR 247) along with the course (EGR 246) gives the student practical experience in experiments involving the mechanics of materials.
3. Students may take GOL 105 or BIO 101 as additional transfer credit to satisfy the Science Elective in ODU's CE curriculum. In most cases, GOL 105 is recommended.
4. Students may take GIS 200 (Geographic Information Systems) at TCC for additional transfer credit. This course corresponds to CEE 240 at ODU.
5. Students may also take CIV 171 (Surveying I - 3 credits) at TCC in place of CET 319 (Surveying - 1 credit) at ODU for additional transfer credit beyond the A. S. degree. This is not a good match in terms of the number of credits, but still may be a good option for some students.

Overall Recommendation:

1. Take EGR 140, EGR 245, and EGR 246 as **Approved Engineering Electives** at TCC.
2. Complete the A.S. degree in Engineering at TCC.
3. Take GOL 105 or BIO 101 for additional transfer credit.
4. Take GIS 200 for additional transfer credit.
5. Consider taking EGR 247.
6. Consider taking CIV 171 at TCC in place of CET 319 at ODU.

Be sure to visit their website!

ODU Civil & Environmental Engineering Home Page: <http://eng.odu.edu/cee/>

ODU Civil Engineering Transfer Worksheet (Unofficial)
(BSCE Degree)

ODU Course #	ODU Course Title	Cr	√	Transfer Credit from TCC
ENGN 110	Freshman Engineering & Technology I	2		EGR 120
CHEM 121N/122N	Chemistry I and Chemistry Lab	4		CHM 111
ENGL 110C	English Composition	3		ENG 111
GEN ED	Human Creativity	3		A. S. Degree *
MATH 211	Calculus I	4		MTH 173
CS 150	Intro to Programming	4		EGR 125
CHEM 123N	Chemistry II	3		CHM 112
MATH 212	Calculus II	4		MTH 174
PHYS 231N	University Physics I	4		PHY 241
CEE 111	Information Literacy & Research	2		EGR 110
Science Elect.	BIO 108N or OEAS 111	4		BIO 101 or GOL 105
MATH 312	Calculus III	4		MTH 277
CEE 204	Statics	3		EGR 140
PHYS 232N	University Physics II	4		PHY 242
COMM 101R	Public Speaking	3		
MAE 220	Mechanics of Solids	3		EGR 246
CET 319	Surveying for Engineers	1		CIV 171
GEN ED	Literature	3		A. S. Degree *
MATH 307	Differential Equations	3		MTH 279
ENGL 211C	English Composition	3		ENG 131
MAE 205	Dynamics	3		EGR 245
CEE 304	Fund. of CEE Infrastructure Systems	3		
CEE 350	Environmental Pollution & Control	3		
CEE 330	Hydromechanics	3		
CEE 305	C & E Engineering Computations	3		
CEE 320	Civil Engineering Materials	3		
CEE 323	Soil Mechanics	3		
CEE 340	Hydraulics & Water Resources	3		
CEE 335	CEE Soils & Hydraulics Lab	1		
CEE 240	Geographic Information Systems	3		GIS 200
GEN ED	Interpreting the Past	3		A. S. Degree *
CEE 310	Structural Engineering I	3		
CEE 410	Concrete Design I	3		
ENGN 401	Fund. of Engineering (FE) Review	1		
CEE 430	Foundation Engineering	3		
CEE 470	Transportation Engineering	3		
CEE 402	Civil & Environ. Engr. Seminar	3		
GEN ED	Gen Ed Upper Level Requirement 1	3		
GEN ED	Human Behavior	3		A. S. Degree *
CEE 4XX	Transp. Or Environ Engr. Elective	3		
CEE 4XX	Civil Engineering Elective	3		
GEN ED	Gen Ed Upper Level Requirement 2	3		
ENMA 480	Ethics & Philosophy in Engr. Apps.	3		
CEE 403W	Civil Engineering Design Project	3		

Total credits in B.S. degree: 130

Max Total Transfer Credits: 72

Note: The ODU Foreign Language Requirement is waived if the A. S. Degree has been completed.

* If the A.S. Degree is completed, the 15 credits of TCC General Education requirements transfer as a block to cover the 15 credits of ODU General Education requirements (see chart on page 16).

ODU Modeling & Simulation Engineering

Transfer Information

What is Modeling & Simulation Engineering?

The following excerpt is from ODU's website:

“The Department of Modeling, Simulation and Visualization Engineering offers an undergraduate, four-year degree program leading to the Bachelor of Science Degree in Modeling and Simulation Engineering (M&SE). The program, thought to be the first undergraduate M&SE program in the United States, was initiated during academic year 2009-2010. ...

The M&SE curriculum is based upon a solid foundation in mathematics and basic sciences. Core program content includes a thorough introduction to key concepts from engineering and computer science, the major modeling and simulation paradigms, computer visualization, statistical analysis methods, and simulation software design. Laboratory courses provide hands-on experience in the engineering of modeling and simulation systems. A capstone course sequence taken during the senior year provides an opportunity to exercise this cumulative preparation to solve a real engineering problem in a team setting. An important component of the program is the requirement that students complete courses in another academic discipline where modeling and simulation is used as a support tool. In addition, course work in General Education skills and ways of knowing is required to assure a well-rounded program of study.”

Transfer Notes:

- Each of ODU's engineering disciplines, including Modeling & Simulation Engineering have a common freshman year. The freshman year of TCC's Engineering program closely matches the freshman year of each of ODU's engineering disciplines.
- Visit ODU's webpage for a copy of their new Modeling & Simulation Engineering curriculum.
- ODU began offering new sophomore-level Modeling & Simulation courses during the 2010-2011 academic year and TCC will begin offering equivalent transfer courses during the 2011-2012 academic year. These courses can be used as Approved Engineering Electives in the current AS degree in Engineering. The new EGR courses will transfer to ODU as follows:
- EGR 218 – Intro to Modeling & Simulation (3 cr) transfers to ODU as MSIM 201(3 cr)
- EGR 230 – Discrete Event Simulation (4 cr) transfers to ODU as MSIM 205 (3 cr) and MSIM 281 (1 cr)

Be sure to visit their website!

ODU Modeling & Simulation Engineering Home Page: <http://eng.odu.edu/msve/>

Virginia Tech Transfer Information

Virginia Tech's College of Engineering is consistently ranked as one of the top engineering colleges in the nation in the quality of its undergraduate education. Virginia Tech offers Bachelor of Science degrees in the following fields:

Aerospace Engineering	Biological Systems Engineering	Chemical Engineering
Civil Engineering	Computer Engineering	Engineering Science and Mechanics
Electrical Engineering	Material Science & Engineering	Industrial and Systems Engineering
Ocean Engineering	Mechanical Engineering	Mining & Minerals Engineering
Computer Science		

Articulation Agreement with Virginia Tech:

In 1992 an articulation agreement was developed between Virginia Tech and all colleges in the VCCS, including TCC. The Articulation Agreement guarantees transfer admission into the College of Engineering at Virginia Tech for all students who complete the A.S. degree in Engineering and have a minimum GPA of 3.0. A copy of the articulation agreement is available online at http://myfuture.vccs.edu/Portals/0/ContentAreas/AcademicServices/VCCS_VT.pdf

Note: Virginia Tech has indicated that they are in the process of adding an additional requirement to the articulation agreement that grades of B or better must be received in all technical courses.

Important notes on the Articulation Agreement:

1. There are several important reasons to *complete the A.S. degree in Engineering* before transferring to Virginia Tech:
 - Students are guaranteed admission with a 3.0 GPA
 - Students receive block credit for general education requirements. All degrees from Virginia Tech must satisfy Areas 1-7 of the Virginia Tech Core Curriculum. Completing the A.S. degree automatically satisfies Areas 1-7. If the degree is not completed, students must be sure to take specific general education courses to satisfy each of these areas.
 - The Leo Padis Scholarship is available only to transfer students from Virginia Community Colleges that complete the A.S. degree in Engineering (more information on page 29).
 - Speakers from Virginia Tech typically visit TCC each year. They always encourage students to complete the A.S. degree and indicated that students that complete the degree before transferring have a higher rate of success.
 - Completing the A.S. degree helps with registering for courses within an certain engineering program. Specifically, if you lack any courses from Virginia Tech's freshman year, you will be admitted into the Engineering Education (Engineering Fundamentals) division rather than into a specific program (such as civil engineering) and you will then be given low priority in terms of enrolling for courses in that program.
2. A 3.0 GPA plus the A.S. degree will guarantee admission into the College of Engineering, but not necessarily into the Engineering program (e.g., Civil, Electrical) of your choice. You should list your 1st, 2nd, and 3rd choices for Engineering departments on your application. You will usually receive the department of your choice unless the department is one that is particularly high in demand and therefore the number of students admitted is limited. This has not been a problem in recent years.
3. 3.0 is the minimum GPA to be guaranteed admission to Virginia Tech, but you might be accepted with a lower GPA.
4. The Articulation Agreement shows that 60 credits in the appropriate areas are required, but you can transfer up to half of the credits in the B.S. degree (typically around 64 credits). You might check the Virginia Tech Transfer Guide to see what other courses will transfer.

5. Virginia Tech officials warn transfer students not to attempt to gain entrance into one program and then try to transfer into another program once you are at Virginia Tech. Only a very limited number of internal transfers are allowed each year and you may not be allowed to change departments.
6. Students may also be interested in knowing that some of the less common areas of engineering such as Biological Engineering (formerly known as Agricultural Engineering) and Mining & Minerals Engineering often have some advantages such as
 - less stringent transfer requirements (sometimes less than a 3.0 GPA is accepted)
 - smaller class sizes
 - scholarships in these areas are much easier to obtain. As an example, often nearly every student in the Mining & Minerals Engineering program is on scholarship (the mining industry provides most scholarships).

Tablet Computers:

Virginia Tech requires all engineering students to own a tablet computer as well as a specific list of software. The requirements in terms of hardware and software change each year so you should request information concerning the current requirements. If you do not already own a tablet computer, Virginia Tech sells computers, software, and service agreements that you might wish to consider. Financing is available to finance computers over the length of your degree program.

Scholarship Information:

Scholarships for transfer students are sometimes hard to obtain, but Virginia Tech does offer one such scholarship. The Leo A. Padis Scholarship is available only to students graduating from a Virginia Community College and transferring into Virginia Tech's College of Engineering.

- The applicant must complete the A.S. degree to be eligible.
- Selection is based on academic performance.
- The number of scholarships varies each year (generally 4 or more).
- The scholarship provides \$1000./year.
- The deadline for application is typically May 1.
- See Paul Gordy in H-115 for an application.

Applying for Admission to Virginia Tech:

Students should address their requests for applications, financial aid and scholarships, catalogues, etc., to Virginia Tech

Office of Undergraduate Admissions
104 Burruss Hall
Blacksburg, VA 24061
Telephone: 540-231-6267

Note that you may also apply on line. Visit Virginia Tech's web site at:

Virginia Tech Home Page: www.vt.edu

Transfer students should apply for Fall semester admission by February 15. There are no advantages to applying earlier (be sure to wait until Fall semester grades are on your transcripts). Students must indicate on their application to which Engineering department they would like to be admitted. First, second, and third choices should be listed on the application (for example, Aerospace, Mechanical, Electrical). Students will be notified concerning their acceptance by May 15 or as soon as possible. Acceptance for Fall admission automatically implies acceptance for the prior Summer semester as well. There is no separate Summer admission. Transfer admissions for Spring semester are not generally accepted. Virginia Tech prefers that transfer students begin either Summer or Fall semester.

Students considering Virginia Tech are strongly encouraged to obtain information early on the engineering program of their choice. This will allow them to compare the 2-year curriculum at TCC to the desired Virginia Tech curriculum and allow them to plan their schedules wisely. Virginia Tech offers accelerated summer sessions where students may take courses that they are lacking so that they can make a smooth transition into the junior year of their program. Virginia Tech tries to offer courses which transfer students often lack during the summer.

Other notes related to admission:

1. CLEP credits are generally not accepted by Virginia Tech.
2. If you transfer less than 45 credits to Virginia Tech, you must also send high school transcripts and SAT scores.
3. International students must score a minimum score of 550 on the TOEFL (not required if ENG 111-112 have been completed).
4. No students are accepted for transfer without ENG 111-112 or the equivalent.
5. Virginia Tech has a foreign language requirement. If you are using high school foreign language courses to meet this requirement be sure to send high school transcripts.
6. If you have any special circumstances to explain (such as a low GPA due to old grades in another curriculum) include a letter of explanation.
7. Send transcripts from all colleges that you have attended. Just because TCC gave you credit for a course from another college, it is not guaranteed that Virginia Tech will do so.
8. Only courses in which you received a grade of C or better will transfer.

For additional information regarding the Engineering program at Virginia Tech, contact:

Paul Gordy, Engineering Department, TCC Virginia Beach
Office: H-115 (Advanced Technology Center)
Phone: 822-7175
E-mail: Pgordy@tcc.edu

Transfer of courses to Virginia Tech

Virginia Tech provides an online transfer guide located at the following URL:

<http://www.registrar.vt.edu/tranguide/2009/vccs/>

Note that only certain courses below may be needed for specific engineering disciplines at Virginia Tech. For example, all disciplines require all of the MATH courses listed below whereas EGR 260-262 are only required for electrical and computer engineering and CHM 241&245 are only required for chemical engineering. Students transferring to Virginia Tech should visit their web site to determine which TCC courses should be selected for transfer.

TCC Course #	TCC Course Title	TCC Cr	VT Course #	VT Cr
EGR 110	Engineering Graphics	3	ENGE 1114	2
EGR 120	Intro to Engineering	2	ENGE 1024	2
EGR 125	Intro to Engineering Methods (C++)	4	ENGE 2324 or ENGE 2314	1, 2
EGR 140	Statics	3	ESM 2104	3
EGR 245	Dynamics	3	ESM 2304	3
EGR 246	Mechanics of Materials	3	ESM 2204	3
EGR 260	Circuit Analysis	3	ECE 2004	3
EGR 261	Signals & Systems	3	2704	3
EGR 262	Fundamental Circuits Lab	2	2274	1
EGR 270	Fund of Computer Engineering	4	ECE 2504	
MTH 173 - 174	Calculus I - II	9	MATH 1205, 1206, 1224	8
MTH 277	Calculus III	4	MATH 2224	3
MTH 279	Differential Equations	4	MATH 2214	3
PHY 241 - 242	University Physics I - II	8	PHYS 2305 - 2306	8
CHM 111*	Chemistry I	4	CHEM 1035, CHEM 1045	4
CHM 112*	Chemistry II	4	CHEM 1036, CHEM 1046	4
CHM 111 – 112*	Chemistry I-II	8	CHEM 1074-1084	3
CHM 241	Organic Chemistry	3	CHEM 2535	3
CHM 245	Organic Chemistry Lab	1	CHEM 2545	1
ENG 111	English Composition I	3	ENGL 1105	3
ENG 112	English Composition II	3	ENGL 1106	3
HIS Elect	History Elective	3	See Note	3
Soc Sci Elect	Social Science Elective	3	See Note	3
Hum Elect	Humanities Elective	3	See Note	3
CSC 201	Computer Science I	4	CS 1044	3

Note: If students satisfy the articulation agreement (complete the A.S. degree with a minimum 3.0 GPA and have all native VCCS credit) then general education requirements are transferred as a block (i.e., the Transfer Module) so the exact courses used for History, Social Science, and Humanities electives do not matter. If students do not satisfy the articulation agreement, then specific courses should be selected in order to satisfy Virginia Tech's University Core Curriculum.

* Virginia Tech no longer requires CHM 112 for any engineering majors except chemical engineering. TCC students may substitute any 4 credits not needed for their AS degree in Engineering in place of CHM 112. See Paul Gordy in H-115 to complete an official substitution form.