Advising the Engineering Community College Student

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Abstract - **A student who wants to start their Engineering education at a Community College has very little idea of what classes to take, what classes transfer to a University and what is needed to succeed. It is imperative that the student has a well-defined pathway and is advised by faculty in the Engineering Department. The Engineering faculty is able to guide the selection of courses for their first two years that transfer to a University, then continue their coursework at the University, which enables them to find employment in their Engineering field of study. The advising model outlined in this report not only guides the student and connects them to their education plan. The Engineering Department at Wake Technical Community College has developed a process that ensures the students chooses the appropriate classes and meets the pre-requisites to graduate with an Associates of Science in Engineering degree. An additional benefit of this model is to give the Engineering faculty member and the student establish rapport with one another. All Engineering Faculty worked in industry, therefore giving credibility to the advising for their semester by semester plan. The student understands the rationale behind the courses that they are to take. Research shows that when students who form a close relationship with an advisor, they complete and succeed at a higher rate. This paper describes the innovative process and interactive model for the student to follow thus providing a pathway to success in Engineering.**

Index terms -Advising, Community College, Transfer, Two-year College

INTRODUCTION

"I have a quick question. What courses do I take next semester?" asks an Engineering student at Wake Technical Community College to the Department Head of Engineering. The Department Head quickly asks a series of questions: What is your name? What is your student ID number? What campus do you normally take your classes, North or Main? What is your intended Engineering major? What University do you want to attend? So the advising begins.

The role of an engineering academic advisor is crucial for the student's success in Engineering at the Community College and subsequent transfer to the University. The advisor provides the student the guidance in the degree requirements for the College, degree requirements for the University and the Engineering discipline that they choose.

The most common complaint from students at community colleges, is the lack of good advising. The students waste time on inappropriate courses due to poor advising. Students run out of time, money and energy and drop out. Well advised students are (a) more likely to enroll, (b) less likely to take classes that do not contribute towards graduation, (c) more likely to enjoy college, (d) more apt to persist [1]. Advising can be labor intensive because the life-work balance is complicated for a community college student. Personal problems, funds for education, work, and career options all are factors that must be considered. Added to the student's needs, the advisor is looking at retention and completion rates for the College.

Another report states that advisement is complicated by the fact that it is traditionally given by department faculty who are not trained to give advisement outside their area and who often do not have counseling skills [2]. The model developed and adopted by the Engineering Department at Wake Technical Community College is that the Department Head and the Engineering Faculty are best suited to advise engineering students.

ADVISING MODEL

The best advice comes from the department, in this case the Engineering department. In response to the item, "Where do you go most often to seek advising," 36% of students identified the central office, 59% a departmental advisor, and 5% other [3].

All of the members of the department have their masters in their engineering fields, have taken and know the content of the engineering courses, have worked in industry and have taught the courses. In comparison, College Transfer advisors are generalists knowing the general education courses to take but not the Engineering courses. To assist the students with the taking the proper Engineering courses, the decision was made by the College that all Engineering students would be advised by the Engineering Department Head.

For the past five years, the number of Wake Technical Community College Engineering students rose from 20 to 1248, on two different campuses. In the beginning, it was not hard for only the Engineering Department Head to

advise the students by simply writing down information on a piece of paper. As time went by, and the Engineering student population increased, more of the same questions were asked and variations of advising forms were created. Very quickly no one was satisfied with the advising process.

In addition to taking courses at the Community College, North Carolina, has are four major Engineering Universities, North Carolina State University (NCSU), UNC Charlotte (UNCC), East Carolina University (ECU) and NC A&T. The most popular University among students to transfer to is NCSU. Each Engineering University has specific courses that are required for specific Engineering majors. A crosswalk was created, see FIGURE 1. The crosswalk takes the semester by semester plan publicized on the Universities website and correlates the corresponding Wake Tech equivalent course. Each student has access to crosswalks for every North Carolina University by engineering discipline.

Beginning in Fall 2013, the Engineering Department realized that the only way that students were to be advised properly was to expand advising to include the faculty. For college records and referrals the advisor of record is the Engineering Department Head. Since all faculty teach the Introduction to Engineering course, and see students usually twice a week, faculty are able to reach more students and include the advising discussion within the class. With all four members of the Engineering Department, one Department head and three faculty members, an advising model and form had to be usable by everyone, easy for the students to use and compact in nature so that most of the students questions could be answered, see FIGURE 2, 3 and 4. Students using the advising model proceed as follows:

- Make an appointment with an Engineering advisor by email or phone
- Enter student information on the top part advising form
- Enter the grades received so far on the second page
- List specific courses of interest
- Submit advising sheet, preferably before the appointment, to the Engineering advisor
- Review the crosswalks for their University and their Engineering discipline

ADVISING FORM

The key to the advising model adopted by the Engineering Department is the three page advising form FIGURE 2, 3 and 4. The first page has basic student information, University, Engineering disciplines at each University and transfer GPA that is required and a two-year sample semester by semester plan starting at Calculus I. The second page lists all of the classes that are required for the Associates in Engineering at Wake Tech. Additional courses are listed that include all of the courses the student may take that transfer to a specific University in a specific discipline. This lets the student see what courses they can take and obtain transfer credit while at Wake Tech. The third page is for the advisor and the student to tentatively work out a semester-by-semester plan.

The Associates of Engineering is a two year program that starts with Calculus I. However, the initial math placement test indicates that most of our students place into Pre-Calculus I, making the semester by semester plan three years long.

ADVISING SESSION

Most of the students fill out their name, Engineering discipline and University they that would like to attend. The rest of the form is usually left blank. Now the advising session begins with the advising form as the guide.

Basic student information is filled out in the top third of page one, FIGURE 2. From the student's transcript, the current program and combined GPA are discussed. Many of our Engineering students are employed, working either 20 to 30 hours and are trying to have a full time academic schedule. This is a good time for the advisor to talk about scheduling, credit versus seated hours and study time. Talking about whether a student has financial aid or is a veteran affects the number of credit hours the student must take. Choosing two different proposed Engineering disciplines is important for selecting courses to take while at the Community College. Page one of the advising form shows the Universities and the transfer GPAs of the Engineering disciplines that the University offers. Four Engineering Universities in North Carolina are listed for comparison so the student and advisor can discuss options in attending various Universities. A survey conducted shows an overwhelming majority of the Engineering students want to major in Mechanical Engineering, followed by Computer Engineering and Electric Engineering. Knowing the Engineering discipline, the advisor insures the student takes required courses for specific Engineering disciplines. For example, the student takes Statics and Dynamics for Mechanical Engineering. Likewise Differential Equations is needed for the Computer Engineering student even though one University does not require it but all others do.

Page two, FIGURE 3, of the advising form outlines the prerequisites and courses needed for certain Engineering majors. A tentative schedule is worked out, on page three, shown in Figure 4. The semester that the student needs to apply to the University for transfer and when to apply for graduation for the Associates in Engineering is discussed.

At the conclusion of the advising session, the form is saved with the filename indicating the last name, first name, student ID and date of advising session on a College shared drive that all Engineering advisors can access. Saving the form this way is very helpful. If an advisors is not available and the student needs to change the plan, the form can be updated by another Engineering advisor. This is similar to a database for the student and advisor. The Engineering advisor sends the advising form via email to the student. Using this approach and form decreases the advising session from one hour to 20 minutes.

The advising session is more than information and advising**;** it sets up rapport and mentoring opportunities. The students learn how to navigate the path to where they want to be. The interactive process between the advisor and the student help the student learn how to plan their educational path. The student-faculty connection establishes and conveys the faculty's interest in the student's success. The Engineering student starts thinking of themselves as Engineers and the Engineering faculty say they learn a great deal about the student in these sessions.

CONCLUSION

This advising model is a practical method of reaching the Engineering student. The form and the crosswalk can be accessed at the College website, in the class and with Engineering advisors. A database is created of the students advised and is accessible by the Engineering Advisors. As course requirements change and crosswalks are updated, the advising form can be adjusted to fit the needs of the Engineering student. The advising form, crosswalk and the advising session answer many questions that the student has. The most important result of this advising model is that the student feels empowered, more focused on the courses that they need to take, and finally has a pathway for their future.

ACKNOWLEDGMENT

I would like to thank the Engineering Department at Wake Technical Community College, Lora Eddington, Deborah Ortiz, and William Hulette for their contributions to the model, innovative teaching methods, and continuous support for the Engineering students.

REFERENCES

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AUTHOR INFORMATION

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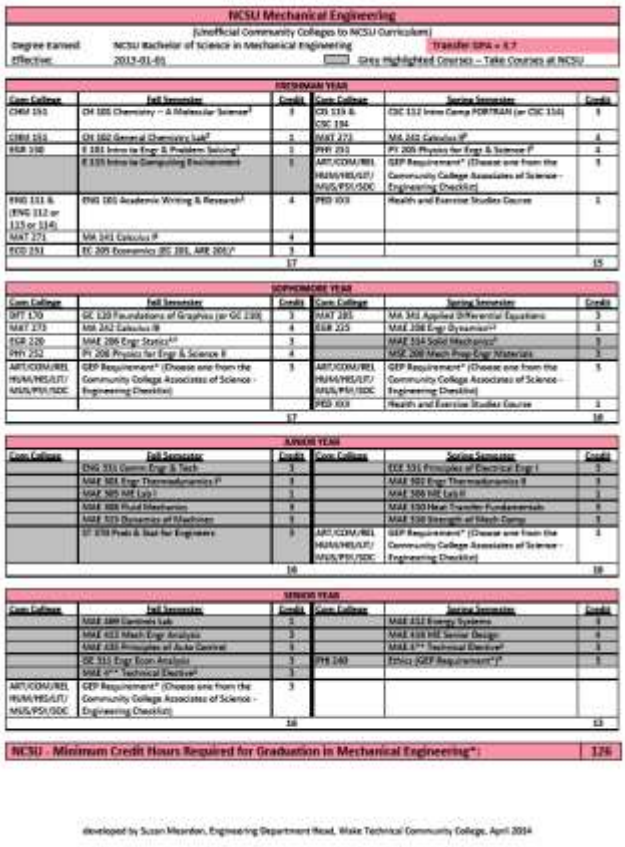
Susan Meardon is the Department Head of Engineering, Wake Technical Community College, Raleigh, North Carolina USA. Ms. Meardon holds her Bachelor and Masters of Science degrees in Electrical Engineering from the University of Central Florida. Her main focus is supporting the Engineering Pathways for Community College Engineering students, making a smooth transition from the 2-year to 4-year institutions.



NCSU Mechanical Engineering

(Unofficial Community Colleges to NCSU Curriculum)

Degree Earned: NCSU Bachelor of Science in Mechanical Engineering — Transfer GPA = 2.7

Effective: 2013-01-01 — Grey Highlighted Courses – Take Courses at NCSU

FRESHMAN YEAR

Com College	Fall Semester	Credit	Com College	Spring Semester	Credit
CHM 151	CH 101 Chemistry – A Molecular Science[1]	3	CIS 119 & CSC 134	CSC 112 Intro Comp PGMTRAN (or CSC 116)	3
CHM 151	CH 102 General Chemistry Lab[1]	1	MAT 272	MA 242 Calculus II[1]	4
EGR 100	E 101 Intro to Engr & Problem Solving[1]	1	PHY 251	PY 205 Physics for Engr & Science I[1]	4
	E 115 Intro to Computing Environment	3	ART/COM/REL HUM/HIS/LIT/ MUS/PSY/SOC	GEP Requirement* (Choose one from the Community College Associates of Science - Engineering Checklist)	3
ENG 111 & (ENG 112 or 113 or 114)	ENG 101 Academic Writing & Research[1]	4	PED XXX	Health and Exercise Studies Course	1
MAT 271	MA 141 Calculus I[1]	4			
ECO 251	EC 205 Economics (EC 201, ARE 201)*	3			
		17			15

SOPHOMORE YEAR

Com College	Fall Semester	Credit	Com College	Spring Semester	Credit
DFT 170	GC 120 Foundations of Graphics (or GC 220)	3	MAT 285	MA 341 Applied Differential Equations	3
MAT 273	MA 242 Calculus III	4	EGR 225	MAE 206 Engr Dynamics[2]	3
EGR 220	MAE 206 Engr Statics[2]	3		MAE 314 Solid Mechanics[2]	3
PHY 252	PY 206 Physics for Engr & Science II	4		MSE 208 Mech Prop Engr Materials	3
ART/COM/REL HUM/HIS/LIT/ MUS/PSY/SOC	GEP Requirement* (Choose one from the Community College Associates of Science - Engineering Checklist)	3	ART/COM/REL HUM/HIS/LIT/ MUS/PSY/SOC	GEP Requirement* (Choose one from the Community College Associates of Science - Engineering Checklist)	3
			PED XXX	Health and Exercise Studies Course	1
		17			16

JUNIOR YEAR

Com College	Fall Semester	Credit	Com College	Spring Semester	Credit
	ENG 331 Comm Engr & Tech	3		ECE 331 Principles of Electrical Engr I	3
	MAE 301 Engr Thermodynamics I[2]	3		MAE 302 Engr Thermodynamics II	3
	MAE 305 ME Lab I	1		MAE 306 ME Lab II	1
	MAE 308 Fluid Mechanics	3		MAE 330 Heat Transfer Fundamentals	3
	MAE 315 Dynamics of Machines	3		MAE 316 Strength of Mech Comp	3
	EF 370 Prob & Stat for Engineers	3	ART/COM/REL HUM/HIS/LIT/ MUS/PSY/SOC	GEP Requirement* (Choose one from the Community College Associates of Science - Engineering Checklist)	3
		16			16

SENIOR YEAR

Com College	Fall Semester	Credit	Com College	Spring Semester	Credit
	MAE 309 Controls Lab	1		MAE 312 Energy Systems	3
	MAE 413 Mech Engr Analysis	3		MAE 418 ME Senior Design	4
	MAE 435 Principles of Auto Control	3		MAE X** Technical Elective[3]	3
	ISE 311 Engr Econ Analysis	3	PHI 240	Ethics (GEP Requirement*)[4]	3
	MAE X** Technical Elective[3]	3			
ART/COM/REL HUM/HIS/LIT/ MUS/PSY/SOC	GEP Requirement* (Choose one from the Community College Associates of Science - Engineering Checklist)	3			
		16			13

NCSU - Minimum Credit Hours Required for Graduation in Mechanical Engineering*: 126

developed by Susan Meardon, Engineering Department Head, Wake Technical Community College, April 2014

NCSU Mechanical Engineering (continued)

(Unofficial Community Colleges to NCSU Curriculum)

Major/Program requirements and footnotes:

[1] Minimum grade of C- required.

[2] Students must have a 2.3 GPA to enroll in this course.

[3] Technical electives must be selected from the following list (when offered): ISE 311, MAE 403, MAE 406, MAE 408, MAE 421, MAE 442, MAE 495 and the following with permission from the instructor: MAE 496 (limited to 3 credit hours), MAE 5**.

[4] Ethics course must be chosen from STS 302, STS 304, STS 320, PHI 214 or PHI 375. A course selected from this list will also fulfill a GEP requirement – see below.

[5] Grade of C (2.0) or higher required.

* General Education Program (GEP) requirements:*

To complete the requirements for graduation and the General Education Program, the following credit hours and co-requisites must be satisfied. University approved GEP course lists for each category can be found at http://pure.ncsu.edu/gep-courses.

PHYSICAL EDUCATION- 2 hours to be selected from the approved GEP Physical Education list.

a. One fitness and wellness course (any PE 100-level course).

b. One additional credit hour of PE activity courses.

HUMANITIES- 6 credits to be selected in two different disciplines (two different course prefixes) from the approved GEP Humanities list. PHI 214 or PHI 375 taken as part of the Major requirements satisfies 3 credit hours of the 6 credit hours needed to fulfill the GEP Humanities requirement.

SOCIAL SCIENCES- 3 credits to be selected in a discipline other than economics from the approved GEP Social Sciences list. EC 205, 201 or ARE 201 taken as part of the Major requirements satisfies 3 credit hours of the 6 credit hours needed to fulfill the GEP Social Sciences requirement.

ADDITIONAL BREADTH- 3 credits to be selected from the approved GEP Humanities, Social Sciences or Visual and Performing Arts lists.

INTERDISCIPLINARY PERSPECTIVES- 5-6 credits to be selected from the approved GEP Interdisciplinary Perspectives list. STS 302, STS 304 or STS 320 taken as part of the Major requirements satisfies 3 credit hours of the 5 credit hours needed to fulfill the GEP Interdisciplinary Perspectives requirement.

Co-requisites:

U.S. Diversity and Global Knowledge co-requisites must be satisfied to complete the General Education requirements. Choose course(s) that are identified on the approved GEP course lists as meeting the U.S. Diversity and Global Knowledge co-requisites.\

Foreign Language proficiency at the FL_102 level will be required for graduation.

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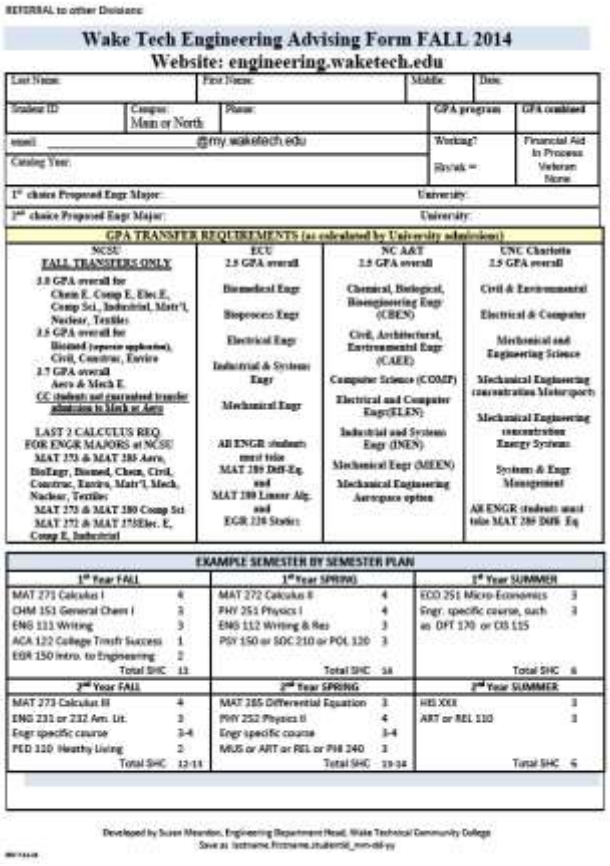
FIGURE 1 Crosswalk for NCSU Mechanical Engineering



REFERRAL to other Divisions:

Wake Tech Engineering Advising Form FALL 2014

Website: engineering.waketech.edu

Last Name:	First Name:	Middle:	Date:
Student ID:	Campus: Main or North: Phone:	GPA program:	GPA combined:
email: @my.waketech.edu		Working? Hrs/wk =	Financial Aid In Process Veteran None
Catalog Year:			
1st choice Proposed Engr Major:		University:	
2nd choice Proposed Engr Major:		University:	

GPA TRANSFER REQUIREMENTS (as calculated by University admission)

NCSU	ECU	NC A&T	UNC Charlotte
FALL TRANSFERS ONLY	2.5 GPA overall	2.5 GPA overall	2.5 GPA overall
3.0 GPA overall for Chem E, Comp E, Elec E, Comp Sci., Industrial, Matr'l, Nuclear, Textiles	Biomedical Engr	Chemical, Biological, Bioengineering Engr (CBEN)	Civil & Environmental
2.5 GPA overall for Biomed (separate application), Civil, Construc, Enviro	Bioprocess Engr	Civil, Architectural, Environmental Engr (CAEE)	Electrical & Computer
2.7 GPA overall Aero & Mech E.	Electrical Engr	Computer Science (COMP)	Mechanical and Engineering Science
CC students not guaranteed transfer admission to Mech or Aero	Industrial & Systems Engr	Electrical and Computer Engr(ELEN)	Mechanical Engineering concentration Motorsports
LAST 2 CALCULUS REQ FOR ENGR MAJORS at NCSU: MAT 273 & MAT 285 Aero, BioEngr, Biomed, Chem, Civil, Construc, Enviro, Matr'l, Mech, Nuclear, Textiles: MAT 273 & MAT 280 Comp Sci MAT 272 & MAT 275Elec. E, Comp E, Industrial	Mechanical Engr	Industrial and Systems Engr (INEN)	Mechanical Engineering concentration Energy Systems
	All ENGR students must take MAT 280 Diff. Eq and MAT 280 Linear Alg. and EGR 226 Statics	Mechanical Engr (MEEN)	Systems & Engr Management
		Mechanical Engineering Aerospace option	All ENGR students must take MAT 280 Diff. Eq

EXAMPLE SEMESTER BY SEMESTER PLAN

1st Year FALL		1st Year SPRING		1st Year SUMMER	
MAT 271 Calculus I	4	MAT 272 Calculus II	4	ECO 251 Micro-Economics	3
CHM 151 General Chem I	3	PHY 251 Physics I	4	Engr. specific course, such as DFT 170 or CIS 115	3
ENG 111 Writing	3	ENG 112 Writing & Res	3		
ACA 122 College Trnsfr Success	1	PSY 150 or SOC 210 or POL 120	3		
EGR 150 Intro. to Engineering	2				
Total SHC	13	Total SHC	14	Total SHC	6
2nd Year FALL		**2nd Year SPRING**		**2nd Year SUMMER**	
MAT 273 Calculus III	4	MAT 285 Differential Equation	3	HIS XXX	3
ENG 231 or 232 Am. Lit.	3	PHY 252 Physics II	4	ART or REL 110	3
Engr specific course	3-4	Engr specific course	3-4		
PED 110 Healthy Living	2	MUS or ART or REL or PHI 240	3		
Total SHC	12-13	Total SHC	13-14	Total SHC	6

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FIGURE 2 - Page one of Advising Model

REFERRAL to other Divisions:

WAKE TECH ASSOCIATES IN ENGINEERING TRANSFERRABLE COURSES TO ENGINEERING UNIVERSITIES IN NORTH CAROLINA

AS degree SHC	Course Requirements: General Education Theme	Total SHC	Course Taken	Transfer EGR required	Grade earned
6 SHC English	ENG 111 Writing and Inquiry	3	ENG 111	req. EGR	
	ENG 112 Writing and Research in the Disciplines	3	ENG 112	req. EGR	
6 SHC Humanities & Fine Arts choice of Hum and FA courses depends on Engineering University	COM 231 Public Speaking	3	COM 231	degree req.	
	HUM 110 (Technology & Society recommended 2nd course)	3			
	Additional 6 -9 credit hrs Hum & FA courses and Foreign Language may be needed to fulfill Gen. Ed. - Engineering University req.				
	ART 111 Art Appreciation or ART 114, Art His I or ART 115 Art His. II	3			
	ENG 231 Am. Lit. I or ENG 232 Am. Lit II	3			
	MUS 110 Mus. Appr. or MUS 112 Intro to Jazz	3			
	PHI 240 Ethics	3			
	REL 110 World Religions	3			
6 SHC Soc & Be	ECO 251 Micro Econ.	3	ECO 251	req. EGR	
	Pick only one History course: HIS 111, 112, (World Civ I, II) HIS 131, 132 (American His. I and II)	3	HIS XXX	req. EGR	
	Additional 3 credit hr of the following in Sociology and Behavioral Science courses may be needed to fulfill Gen. Ed. - Engineering University requirements				
	POL 120 American Government (for NCSU Civil Engineering)	3			
	PSY 150 General Psychology	3			
	SOC 210 Intro. to Sociology	3			
PRE-REQ MATH courses	DMS 089 Developmental MATH				
	MAT 171 Pre-Calculus I	4			
	MAT 172 Pre-Calculus II	4			
8 SHC MATH	MAT 271 Calculus I *pre-req MAT 172* Calc I - lowest level math course that can be applied to AS degree	4	MAT 271	req. EGR	
	MAT 272 Calculus II	4	MAT 272	req. EGR	
	MAT 273 Calculus III	4	MAT 273	req. EGR	
8 SCH Natural Sciences	CHM 151 General Chemistry I *pre-req MAT 171* Must take CHM 098 or 092 if no Chem in HS.	4	CHM 151	req. EGR	
	PHY 251 Physics I *pre-req MAT 271 co-req MAT 272*	4	PHY 251	req. EGR	
	PHY 252 General Physics II	4	PHY 252	req. EGR	
TOTAL GENERAL EDUCATION HOURS REQ.:					42 SHC
18 SCH Students should choose courses appropriate to the specific University and Engineering Major reqs.	ACA 122 College Transfer Success	1	ACA 122	req. EGR	
	EGR 150 Intro to Engineering	2	EGR 150	req. EGR	
	MAT 285 Differential Equations *pre-req MAT 272 (ALL ENGRS)*	3	MAT 285	req. EGR	
	MAT 280 Linear Algebra (Comp. Sci. & for ECU Engineering transfer)	3	MAT 280		
	CIS 115 Intro to Programming and Logic	3			
	CSC 116 C++ *pre-req CIS 115, replaces FORTRAN*	3			
	CSC 151 JAVA *pre-req CIS 115 (Comp. Sci majors need to take)*	3			
	GEL 111 Geology I (Civil option)	4			
	CHM 152 Chem II (Chem E, Biomed, Civil option)	4			
	CHM 251 Organic Chemistry I (Chem E, and Biomed)	4			
	CHM 252 Organic Chemistry II (Chem E, and Biomed)	4			
	DFT 170 Engineering Graphics (Computer Aided Design, Solid Works)	3			
	EGR 120 Statics *pre-req PHY 251, co-req MAT 273.* (req. for all Mechanical & ECU Engineering transfer students)	3			
	EGR 125 Dynamics *pre-req EGR 120* (all Mechanicals)	3			
	PED 110 Healthy Living (2) not recommended first semester	2	PED XXX		
OTHER REQ. EGR HOURS					18 SHC
Courses should be selected from courses classified as premajor, elective or general education courses within the Comprehensive Articulation Agreement.					
Students must meet the receiving university's foreign language and/or physical education requirements, if applicable, prior to or after transfer to the senior institution.					
TOTAL SEMESTER HOURS CREDIT (SHC) in PROGRAM:					60 - 61 SHC

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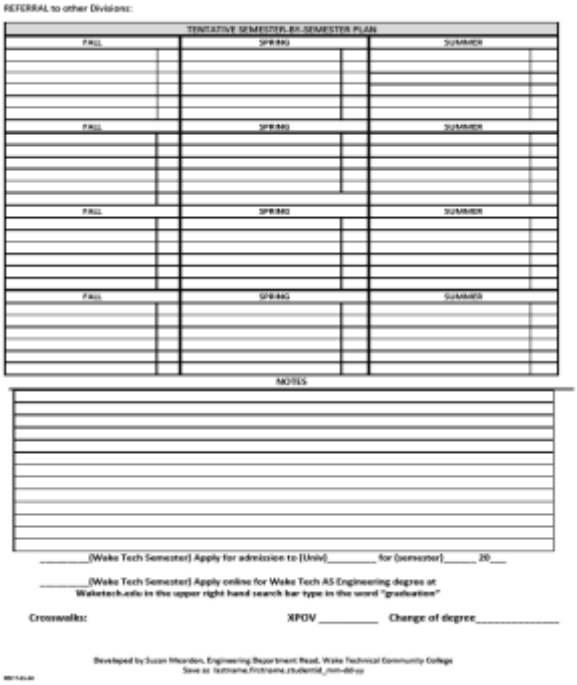
Save as lastname.firstname.studentid_mm-dd-yy

FIGURE 3 - Page two of Advising Model



REFERRAL to other Divisions:

TENTATIVE SEMESTER BY SEMESTER PLAN

FALL	SPRING	SUMMER
FALL	SPRING	SUMMER
FALL	SPRING	SUMMER
FALL	SPRING	SUMMER

NOTES

_____(Wake Tech Semester) Apply for admission to (Univ)_____ for (semester)_____ 20__

_____(Wake Tech Semester) Apply online for Wake Tech AS Engineering degree at Waketech.edu in the upper right hand search bar type in the word "graduation"

Crosswalks: XPOV _____ Change of degree_____

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FIGURE 4 - Page three of Advising Form