



JUN -6 P1:31

MANOA UNIMORELLURY OFFICE

January 31, 2019

# **MEMORANDUM**

TO:

Michael Bruno

Provost

CC:

Krystyna Aune

Graduate Dean

Julienne Maeda

Associate Graduate Dean

Ron Riggs

Interim Dean, College of Engineering

Wayne Shiroma Wayna Shurena

Department Chair, Department of Electrical Engineering

FROM:

Gurdal Arslan

Graduate Chair, Department of Electrical Engineering

SUBJECT: EE Combined BS-MS Degree Application

#### SPECIFIC ACTION REQUESTED:

It is requested that the Vice Chancellor for Academic Affairs approve the combined pathways for Bachelor of Science and Master of Science in Electrical Engineering.

#### RECOMMENDED EFFECTIVE DATE:

Fall 2019 semester.

#### ADDITIONAL COST:

No additional cost.

#### PURPOSE:

To allow the qualified students to receive a combined Bachelor of Science and Master of Science degree in Electrical Engineering in five years

- To attract and retain highly motivated students who are interested in the EE graduate program
- To increase the number of MS enrollments in the EE graduate program and to decrease the average time-to-degree for the EE-MS program

## PROPOSED PROGRAM:

As indicated in the catalog, existing BS and MS programs in EE have three major tracks of specialization: computers, electro-physics and systems (except that the computers track at the undergraduate program level corresponds to the Computer Engineering program). Accordingly, both the gateway courses to enter the combined pathways and the courses that can be double-counted are separately listed for each track. The students must pass the gateway courses with a minimum grade of B+ in order to be considered for the pathway.

## Computers Track:

Gateway Course: EE 361
Double-Counted Courses:

- 1. EE 468, and
- 2. EE 602 or EE 660, and
- 3. EE 607 or EE 609

Electro-physics Track: BMEP

Gateway Course: EE 371 Double-Counted Courses:

- 1. EE 438 or EE 480, and
- 2. EE 671 or EE 624, and
- 3. EE 681 or EE 682

#### Systems Track:

Gateway Course: EE 315
Double-Counted Courses:

- 1. EE 417 or EE 445, and
- 2. EE 640 or EE 650
- 3. EE 615 or EE 617

# **ACTION RECOMMENDED:**

It is recommended that the Vice Chancellor for Academic Affairs approve the combined pathways for Bachelor of Science and Master of Science in Electrical Engineering.

#### Attachments:

- 1. EE BS and MS Checksheets for Computers Track
- 2. EE BS and MS Checksheets for Electro-physics Track
- 3. EE BS and MS Checksheets for Systems Track

Approved/Disapproved:

Michael Bruno

Provost

6/20/19 Date

	F14-31 F : :	News							
Computer Engineering (BS) + Electrical Engineering (MS)					Name:				
Iniversity of Hawaii a					NO DO . EE M	ID#			_
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							ons must be approved	l by t	he
		nt chair, and dean. Th	he Un	iversity	General Educ	ation Cor	e and graduation		
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ing 100 (FW)	3	EE 160	4	- IE	E 211	4	EE 213	4	
Math 241 (FQ)	4	Math 242	4		E 260	4	EE 205	3	
Chem 161 (DP)	3	Phys 170 (DP)	4		ath 243	3	Math 244	3	
Chem 161L (DY)	1	Phys 170L (DY)	1		nys 272 (DP)	3	Phys 274	3	
G	3	Chem 162 (DP)	3	-	rys 272L (DY)	1	FG	3	
H Focus (1)		E Focus (1)		0	Focus (1)		W Focus (5)		
	•		UPPE	R DİVI					
E 324	3	EE 315	3	E	342	3	EE 496	3	
E 371	3	EE 323	3	E	467 or ICS 314	3	Econ 120, 130 or 131 (DS)	3	
E 361 Gateway (B+	) 3	EE 323L	1	E	E 468 (B)	3	EE 602 or EE 660 (B)	3	
E 361L	1	EE 367	3	Do	ouble Counted	3	TE Double Counted	3	
EE 362	3	EE 367L	1	DI	l or DL	3	EE 607 or EE 609 (B)	3	
Math 307	3	EE 396	2	C	DMG 251 (DA)	3	TE Double Counted	3	
		TE	3	EE	495	1	DS	3	
							TOTAL BS CREDIT	1	23
One course each require Enrollment in EE courses	ute for EE 3 or EE 367/3 uired - 5 co d for Hawai s requires a	62.	H), Oral rerequis	Commur	es.				
CEE 270; or a physical, Curriculum Committee.	biological,	or computer science course			-				
I. ENGR 196/296/396 ma	y substitute			UATE I	EVEL		<u> </u>		
aior EE 600 Cot 1	2	Outside Major EE 400+			n B: Elective 400+	2	Plan A: EE 700	9	
lajor EE 600 Cat 1	3 3					_	-	ਝ	$\vdash$
lajor EE 600 Cat 2	3	Outside Major EE 400+	- 3		n B: EE 699	3	Seminar Attendence (12)		-
lan A. Farre I	-	Dies & Court			n B: EE 699	3	Final Exam		-
lan A: Form I		Plan A: Form II			ın A: Form III		Plan A: Form IV		CO
lan B: Final Exam Form							TOTAL BS+MS CREDIT	- 1	53
RADUATE PROGRAM NOT							AJOR TRACKS		
At most 3 credits of 400-lev			. 11 .4		Systems	Category I	Category II		_
	-	tered during the semester of gr			L	EE 615,	EE 616, 617, 641, 642, 643	645. 6	646
		their EE 699 credits to EE 700			Graduate	10 10, 04U, FE 648 649 693D 693H		- 191	
	_	al Sci., SOEST, Business, or by				644, 650	<u> </u>		
Plan B: 6 credits of EE 699	can be subs	tituted by 6 credits in 600-level	courses	in EE.	Electro-Physics	[Category I	and II (lumped)		
	i. More rigorous courses from the other programs may be used to satisfy major track or				<del></del>	<del> </del>			
. More rigorous courses from				ack or	Graduate	EE 620, 62	1, 622, 624, 626, 627, 628, 6		3
i. More rigorous courses from		ograms may be used to satisfy proval from the graduate chair.		ack or	Graduate	EE 620, 62 EE 675, 68			3

requirements subject to prior approval from the graduate chair.

requirements.

8. Only one out of multiple courses with significantly overlapping contents

(for example, cross-listed courses) can be used to satisfy any course requirement. 9. Only the courses with a grade of B or better (not B-minus) can count towards the course

Category I | Category II EE 604, 606, 607, 608, 609, 644 EE 602 EE 665, 668, 693B, 693E, 693F Graduate EE 660 ICS 612, 613, 632, 651 APPROVAL FOR GRADUATION: Initial: Date:

Electrical Engineerin	g				Name	e:		
Jniversity of Hawaii					ID#	f:		
		ULUM CHECK SHEE	T for EE	E-BAM Electrophysic	s Track (A	August 2019)		
The program of cou	ırses liste	ed below satisfies the	ABET	accreditation criteria	of 32 cre	edits of mathematics ar	nd ba	sic
						ions must be approved		
		nt chair, and dean. T						
equirements for Er								
	_	LL COURSES MUST	BE TAI	KEN FOR LETTER (	A-F) GRA	DES		
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ing 100 (FW)	4	<del></del>	4	EE 260	4		3	_
Math 241 (FQ) Chem 161 (DP)	3	Math 242 Phys 170 (DP)	4	Math 243	3	Math 244	3	_
Chem 161L (DY)	1	Phys 170 (DP)	1	Phys 272 (DP)	3	Phys 274 EE 296	1	_
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<u> </u>	<del></del>	Chem 162 (DP)	3	FIIYS 272L (DT)		FG	3	_
Focus (1)	-	E Focus (1)		O Focus (1)		W Focus (5)	- 3	
rocus (1)		E Focus (1)	LIDDE	R DIVISION		IVV Focus (5)		_
E 315	3	EE 323	3	1	_	IEE 496	3	_
E 324	3	EE 323L	1	EE 624 or EE 671 (B) Major Double Counted	3	Econ 120, 130 or 131 (DS)	3	_
E 371 Gateway (B-		EE 342	3	Major EE 326	3	EE 438 or EE 480 (B)		_
Math 307	3	Major EE 372	3	Major EE 326L	1	TE Double Counted	3	
В	3	Major EE 372L	1	DH or DL	3	EE 681 or EE 682 (B)	_	_
		EE 396	2	EE 495	1	Major Double Counted	3	
		Major EE 327	3	Outside Major Track TE	3	DS Double Counted	3	_
		IVIAJOI LL 321	- 3	(Lab) TE	1	TOTAL BS CREDIT	122	140
Math 251/252/253 may 5 Chem 181/181L or Chem		r Math 241-244 may substitute for Chem 161	1/161L an	d Chem 162.				
		urses (minimum of 2 in uppe						
		ian, Asian & Pacific Issues (			ntemporary I	Ethical Issues (E)		
		grade of 'C' or better in all p			itemporary i	Luncai 133063 (L <i>j.</i>		
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ENGP 106/206/306 may	SUDSULUIC I	-		1L, 366, 367/367L, 343/343	3L, 351/351L	., 344, 415.		
	حصر بالبيمة	or EE 196/296/396.						
0. A student along with a		or EE 196/296/396. ber may propose an alternat	te track, w	hich must be (1) equivalen	t in rigor & b	readth to the above tracks;		
0. A student along with a		or EE 196/296/396. ber may propose an alternal mber; & (3) approved by the	te track, w Departme	hich must be (1) equivalen	t in rigor & b	readth to the above tracks;		
A student along with a     (2) endorsed by another	r faculty mer	or EE 196/296/396. ber may propose an alternal mber; & (3) approved by the	te track, w Departme GRADU	hich must be (1) equivalen nt's Undergraduate Currict ATE LEVEL	t in rigor & b ulum Commi	readth to the above tracks; ttee.		
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(2) endorsed by another Major EE 600 Cat 1 Major EE 600 Cat 2 Plan A: Form I Plan B: Final Exam Form SRADUATE PROGRAM NOT At most 3 credits of 400-lev Plan A: 1 credit of EE 700 of Plan A: Students can petitic Plan B: Elective 400+ from Plan B: 6 credits of EE 699 More rigorous courses from	3 3 3 EES vel courses armust be regis on to convert of Engr., Natur l can be subsi	or EE 196/296/396. ber may propose an alternal mber; & (3) approved by the  Outside Major EE 400-  Outside Major EE 400-  Plan A: Form II  re allowed in graduate level. tered during the semester of graduate in the semester of	te track, w Departme GRADU + 3 + 3 raduation. credits. by approval courses in	hich must be (1) equivalen nt's Undergraduate Currice ATE LEVEL Plan B: Elective 4004 Plan B: EE 699 Plan B: EE 699 Plan A: Form III  Systems Graduate EE. Electro-Physics	3 3 3 3 3 Category EE 615, 618, 640, 644, 650 Category EE 620, 6	Plan A: EE 700 Seminar Attendence (12) Final Exam Plan A: Form IV TOTAL BS+MS CREDIT MAJOR TRACKS Category II EE 616, 617, 641, 642, 643, EE 648, 649, 693D, 693H and II (lumped)	152/ 645, 6	46

requirements subject to prior approval from the graduate chair.

requirements.

8. Only one out of multiple courses with significantly overlapping contents

(for example, cross-listed courses) can be used to satisfy any course requirement.

9. Only the courses with a grade of B or better (not B-minus) can count towards the course

Date:

EE 604, 606, 607, 608, 609, 644

EE 665, 668, 693B, 693E, 693F

ICS 612, 613, 632, 651

EE 602

EE 660

APPROVAL FOR GRADUATION: Initial:

Graduate

#### Electrical Engineering Name: ID #: University of Hawaii at Manoa CURRICULUM CHECK SHEET for EE-BAM Systems Track (August 2019) The program of courses listed below satisfies the ABET accreditation criteria of 32 credits of mathematics and basic sciences, and 48 credits of engineering sciences and engineering design. Any deviations must be approved by the student's advisor, department chair, and dean. The University General Education Core and graduation requirements for Engineering are included. ALL COURSES MUST BE TAKEN FOR LETTER (A-F) GRADES **FRESHMAN** SOPHOMORE EE 110 or EE 160 3 3/4 EE 211 Eng 100 (FW) 4 EE 213 4 Math 241 (FQ) 4 3 4 Math 242 EE 260 4 Math 244 4 Chem 161 (DP) 3 Phys 170 (DP) Math 243 3 Phys 274 3 1 3 Chem 161L (DY) 1 Phys 170L (DY) Phys 272 (DP) EE 296 1 FG 3 Chem 162 (DP) 3 Phys 272L (DY) 1 COMG 251 (DA) 3 FG 3 H Focus (1) E Focus (1) O Focus (1) W Focus (5) UPPER DIVISION EE 315 Gateway (B+) 3 EE 323 3 EE 496 3 EE 640 or EE 650 (B) 3 EE 324 3 EE 323L 1 3 Major Double Counted Econ 120, 130 or 131 (DS) EE 371 3 3 EE 417 or EE 445 (B) EE 342 Maior EE 415 3 3 Math 307 3 3 Major EE 343 3 TE Double Counted Major EE 351 Outside Major Track TE 3 Major EE 351L 1 Maior EE 343L 1 EE 615 or EE 617 (B) 3 1 EE 396 2 3 (Lab) TE Major Double Counted DH or DL 3 EB EE 495 1 DS 3 122/123 TOTAL BS CREDIT UNDERGRADUATE PROGRAM NOTES Refer to General Education Core Requirements in UHM Catalog for Diversification (DH, DL, DS) and FG Foundation Courses. Math 251/252/253 may substitute for Math 241-244 Chem 181/181L or Chem 171/171L may substitute for Chem 161/161L and Chem 162. 4. Writing Intensive (W) required - 5 courses (minimum of 2 in upper division). 5. One course each required for Hawaiian, Asian & Pacific Issues (H), Oral Communication (O) and Contemporary Ethical Issues (E). Enrollment in EE courses requires a grade of 'C' or better in all prerequisite courses. 7. Engineering Breadth (EB) is satisfied by a CEE, ME, OE or BE course at the 300-level or higher, CEE 270; or a physical, biological, or computer science course at the 300-level or higher and approved by the Department's Undergraduate Curriculum Committee. 8. Technical Electives (TE): The following courses may be used: EE 361/361L, 366, 367/367L, 326/326L, 328/328L, 372/372L, 422/422L. 9. ENGR 196/296/396 may substitute for EE 196/296/396. 10. A student along with a faculty member may propose an afternate track, which must be (1) equivalent in rigor & breadth to the above tracks; (2) endorsed by another faculty member; & (3) approved by the Department's Undergraduate Curriculum Committee. **GRADUATE LEVEL** Major EE 600 Cat 1 3 Outside Major EE 400+ 3 Plan B: Elective 400+ 3 Plan A: EE 700 9 Major EE 600 Cat 2 3 Outside Major EE 400+ Plan B: EE 699 3 Seminar Attendence (12) 3 Plan B: EE 699 Final Exam Plan A: Form I Plan A: Form II Plan A: Form III Plan A: Form IV TOTAL BS+MS CREDIT Plan B: Final Exam Form GRADUATE PROGRAM NOTES 1. At most 3 credits of 400-level courses are allowed in graduate level.

At most 3 credits of 400-level courses are allowed in graduate level.
 Plan A: 1 credit of EE 700 must be registered during the semester of graduation.

3. Plan A: Students can petition to convert their EE 699 credits to EE 700 credits.

5. Flan A. Stadents can petition to convent their EE 033 credits to EE 700 credits.

4. Plan B: Elective 400+ from Engr., Natural Sci., SOEST, Business, or by approval.

5. Plan B: 6 credits of EE 699 can be substituted by 6 credits in 600-level courses in EE.

More rigorous courses from the other programs may be used to satisfy major track or breadth requirements subject to prior approval from the graduate chair.

Relevant courses from the other programs may be used to satisfy elective course requirements subject to prior approval from the graduate chair.

Only one out of multiple courses with significantly overlapping contents (for example, cross-fisted courses) can be used to satisfy any course requirement.

Only the courses with a grade of B or better (not B-minus) can count towards the course requirements.

		TOTAL BOTING CREDIT 102 100				
	MA	AJOR TRACKS				
Systems Category		Category II				
EE 615, Graduate 618, 640, 644, 650		EE 616, 617, 641, 642, 643, 645, 646 EE 648, 649, 693D, 693H				
Electro-Physics	Category I and II (lumped)					
Graduate	EE 620, 621, 622, 624, 626, 627, 628, 671, 673 EE 675, 680, 681, 682, 685, 693C, 693I, 693J					
Computer	Category I	Category II				
Graduate EE 602 EE 660		EE 604, 606, 607, 608, 609, 644 EE 665, 668, 693B, 693E, 693F ICS 612, 613, 632, 651				
APPROVAL FO	R GRADU	JATION: Initial: Date:				