

NEW ENGINEERING BUSINESS MINOR & COMPARISON TO THE GENERAL BUSINESS AND ENTREPRENEURSHIP MINORS

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**PROFESSOR OF PRACTICE, SYSTEMS & INFORMATION ENGINEERING
ENTREPRENEURSHIP, INNOVATION, AND BUSINESS**

25 MARCH 2024

 **UVA ENGINEERING**



Engineering and Technology

Plus

Business and Innovation

Equals

Impact

Minor

AY 2022-23

AY 2023-24

AY 2024-25

**Engineering
Business**

- 18 credits
- Apply in Nov and via special cycle

- Already enrolled students continue
- Old EBM closed to new applicants

- ***New EBM***
- Likely 15 credits
- Product & innovation
- Apply in Spring '24

**General
Business**
(conferred by
McIntire)

- 15 credits
- Pilot year
- Declare when eligible
(COMM 1800 plus 2 core)

- Ramp up
- Declare when eligible

Entrepreneurship
(McIntire plus E-School
for Tech Concentration)

- 15 credits
- 3 Concentrations
- Apply in Feb
(need ENTP 1010)

- Continues as is

- Continues
- Offer new Tech Capstone course – Innovation Garage

The revisions to the Engineering Business Minor were driven by key criteria related to industry trends and engineering-specific curriculum.

- ✓ Update the Engineering Business Minor to reflect the importance innovation and product development play in technology-centric businesses.
- ✓ Incorporate input from accomplished alumni, recent graduates, and faculty.
- ✓ Differentiate the Engineering Business Minor from the just-launched McIntire General Business Minor.
- ✓ Construct a minor that allows for incorporation of discipline-specific electives focused on the application of engineering skills and knowledge.

The new Engineering Business Minor curriculum focuses on business fundamentals, innovation, product development, markets, and professional skills.

Students completing the new UVA Engineering Business Minor will focus on specific key learning objectives.

Engineering Business Minor Key Learning Objectives

- ✓ Develop an understanding of company structures, how functions work together to serve customers, and differences between early-stage ventures and established large companies.
- ✓ Be able to comprehend and create financial statements and evaluate businesses via basic financial analyses.
- ✓ Learn how to apply techniques to identify unmet customer needs, evaluate market opportunities, and define compelling value propositions.
- ✓ Acquire an understanding of product development and business building frameworks and learn how to apply them to achieve product-market fit.
- ✓ Appreciate the role innovation plays in business and learn how to look for and develop opportunities to leverage technology to create value.
- ✓ Build professional soft skills in communications, self awareness, teamwork, and continuous learning.

A new course code is being implemented for Engineering Business and Tech Entrepreneurship classes, which are now housed in the Systems & Information Engineering Department.

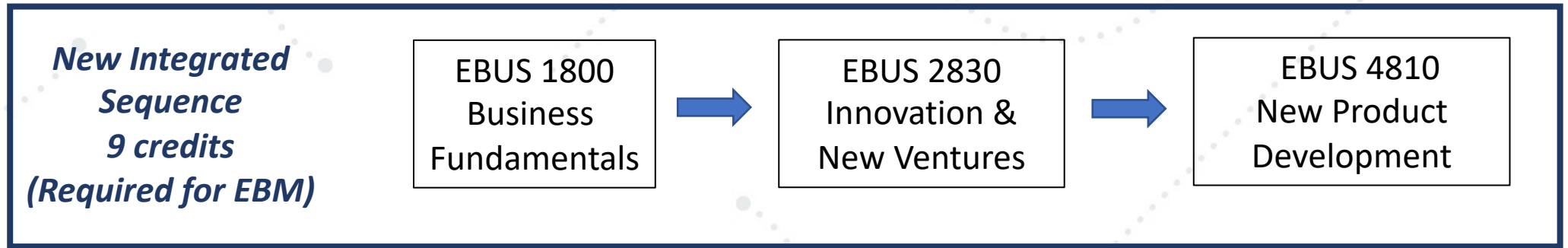
STS => EBUS Mnemonic

- Starting in Summer '24, all Engineering Business and Tech Entrepreneurship classes will be identified with the EBUS code.
- Existing course numbers will remain the same, e.g., STS 1800 Business Fundamentals becomes EBUS 1800 Business Fundamentals.
- The same course previously taken under the STS code can be used to fulfill the new EBM requirement under the EBUS code (and vice versa for students pursuing the old EBM, though EBUS courses cannot be used to fulfill the STS 2/3XXX elective requirement).
- As with COMM classes, EBUS courses qualify only as Unrestricted Electives.

Engineering & Society => Systems & Information Engineering

- The Engineering Business Minor will move from the E&S Department to the SIE Department. The minor remains open to, and designed for, all students, regardless of major

The revised Engineering Business Minor will anchor on a 3-course “Integrated Sequence” and combine business fundamentals and innovation concepts.



Add 6 credits from a curated list for the Engineering Business Minor*



Key criteria for approved electives:

- ✓ Consistent with EBM learning objectives
- ✓ Directly relevant to working in technology and engineering industries
- ✓ Complementary to required courses

* Seeking approvals to reduce total required credits from 18 to 15

The revised set of requirements will leverage three existing courses that have been updated and improved over the last year.

EBUS 1800 Business Fundamentals	EBUS 2830 Innovation & New Ventures	EBUS 4810 New Product Development
<p>This course introduces students to key business topics relevant to high technology companies. Students will learn how to understand and interpret financial statements and frame financial decisions, including building a business case. The course will explore typical organizational structures and the roles of business functions. Students will be introduced to business models and other concepts in marketing and business strategy.</p>	<p>An introduction to concepts innovators use to solve problems and create value by addressing unmet needs. Learn how to identify and evaluate opportunities and use proven entrepreneurial frameworks to create new products and businesses for companies of all sizes. Through class activities, projects, and presentations you will learn how storytelling, teamwork, and leadership skills are essential for starting, funding, and building your business.</p>	<p>Students will learn the fundamentals of product management. Topics include identifying unmet needs, understanding markets, implementing product development frameworks and processes, building businesses, and working with multi-functional teams. The application of these concepts to different phases of the product lifecycle will be explored. Students will build technical, professional, and soft skills necessary for success in product management.</p>

The approved electives for the revised Engineering Business Minor will fall into the following categories.

Category	Comments
EBUS Courses (formerly STS)	<ul style="list-style-type: none">• Engineering Business and Tech Entrepreneurship• In addition to the three required courses, the school currently supports four to five EBUS electives per year.• All catalog-listed EBUS course are approved electives but some may not be offered due to lack of instructor.• 2/3/4000 level special topics classes also in catalog
COMM Classes	<ul style="list-style-type: none">• Selected classes that meet the EBM's elective criteria• Note that many 4000-level COMM classes that may meet the criteria are restricted to McIntire students
SEAS Technical Electives	<ul style="list-style-type: none">• Selected departmental courses that are closely related to product development and key business capabilities (e.g., innovation, design, and commercialization).• Courses also satisfy technical elective requirements, helping students with accessibility of the minor.
Other Classes	<ul style="list-style-type: none">• Selected classes that meet the EBM's elective criteria• Expect very few classes in this category

Initially, students will be able to choose from the following approved electives:

EBUS Electives (formerly STS)

EBUS 2730 Engineers & the Art of the Deal
EBUS 2840 Entrepreneurial Finance
EBUS 2850 Government & Entrepreneurship
EBUS 2890 Driving Business Growth Through
Innovation: Past to Present
EBUS 3570 Special Topics in Eng Business:
Leadership in the Tech Sector
EBUS 4580 Special Topics in Eng Entrprnrship:
Innovation Garage

COMM Electives

COMM 2600 Leadership Across Disciplines
COMM 3200 Project & Product Management
COMM 3230 Managing Innovation
COMM 3410 Commercial Law I
COMM 3845 Foundations in Int'l Business
COMM 3880 Global Sustainability
COMM 4822 Investing in Sustainable Future
ENTP 1010 Intro to Entrepreneurship

SEAS Departmental Electives

APMA 3150 From Data to Knowledge
BME 3030 Innovation & Design in Medicine
CE 2030 Mgt of Eng & Constr Project
CE 3010 Project Business Planning
CS 4260 Internet Scale Applications
ENGR 4880 Business & Tech Leadership in Engr
SYS 2/3054 Systems case Studies (Int'l)
SYS 4000 Financial Aspects of Engineering
SYS 4044 Engr Economic Systems

Other Electives

ECON 2010 Prin of Econ: Microeconomics

- EBUS offerings dependent on instructor availability. Additional course are listed in the catalog but not currently offered.
- Plan is to expand SEAS departmental electives, as available and appropriate.
- Elective list will evolve over time.

Students will be admitted to the Engineering Business Minor (EBM) via a lightweight application process, the first of which will open in March '24.

- The application process will be run by the EBM Program team within Systems & Information Engineering and open to all Engineering and BA Computer Science students.
- The EBM application will require:
 - Student identification information
 - Student GPA, primarily to verify good academic standing
 - A brief statement on interest in pursuing the EBM
 - An acknowledgement by the student that they are confident that they can complete the curriculum before their planned graduation date (there will be no restrictions on student year)
- Students can take relevant courses before being admitted. Those courses will count for the EBM's requirements. In time, and depending on demand, admitted EBM students may receive preference to enroll in EBM-required courses.
- Starting in Spring '24, EBUS 1800 will likely become a pre or co-requisite for most higher level EBUS courses.

Students can also consider the McIntire General Business Minor and Entrepreneurship Minor, the latter of which includes a tech concentration offered in partnership with the Engineering School.

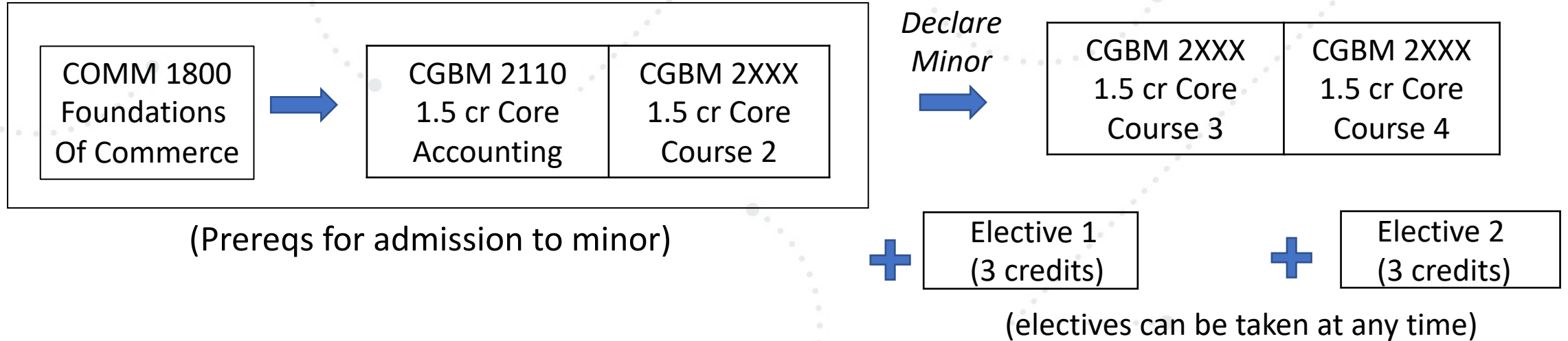
- **General Business Minor**

- Students must start with COMM 1800.
- Following completion of COMM 1800 and two of the four 1.5 credit core courses, students can declare the minor (no application process).
- The approved elective list includes four EBUS (formerly STS) courses.
- More info can be found here: <https://www.commerce.virginia.edu/minors/general-business>

- **Entrepreneurship Minor**

- Three concentration areas: 1) Innovation in Business, 2) Social Entrepreneurship, 3) Technology Entrepreneurship
- Concentration areas are defined by taking one core course and one capstone course.
- Students must take or be enrolled in ENTP 1010 to apply to the minor.
- The application process is usually in February.
- More info can be found here: <https://www.commerce.virginia.edu/minors/entrepreneurship>

General Business Minor – 15 credits



Required		Electives (6 credits) – Proposed Initial List:
CGBM 2110 Accounting for Business	CGBM 2310 Marketing Principles: Goods, Services and Brands	<ul style="list-style-type: none"> • COMM 2020, 2730, 3140, 3700*, 4599 • ECON 2010 Microeconomics • EBUS (STS) 2730 Engineers and the Art of the Deal • EBUS (STS) 2830 Innovation and New Ventures • EBUS (STS) 2850 Entrepreneurship & Government • EBUS (STS) 4810 New Product Development • Others may be added
CGBM 2210 Digital Skills for the Workplace	CGBM 2710 Making Financial Decisions	

* Not offered in '23-24 academic year but will count if previously taken

Positioning of New EBM versus McIntire GBM



Engineering Business Minor

- ✓ Focused on product development, business building, and engineering management
- ✓ Tailored to engineering student curriculum and skills (e.g., strong quantitative and technical skills)
- ✓ Allows for electives that are appropriate only for engineering students

=> Best for students interested in engineering, product management, and working in technology-centric businesses

=> Can also be an option for students interested in technical consulting or advising tech businesses



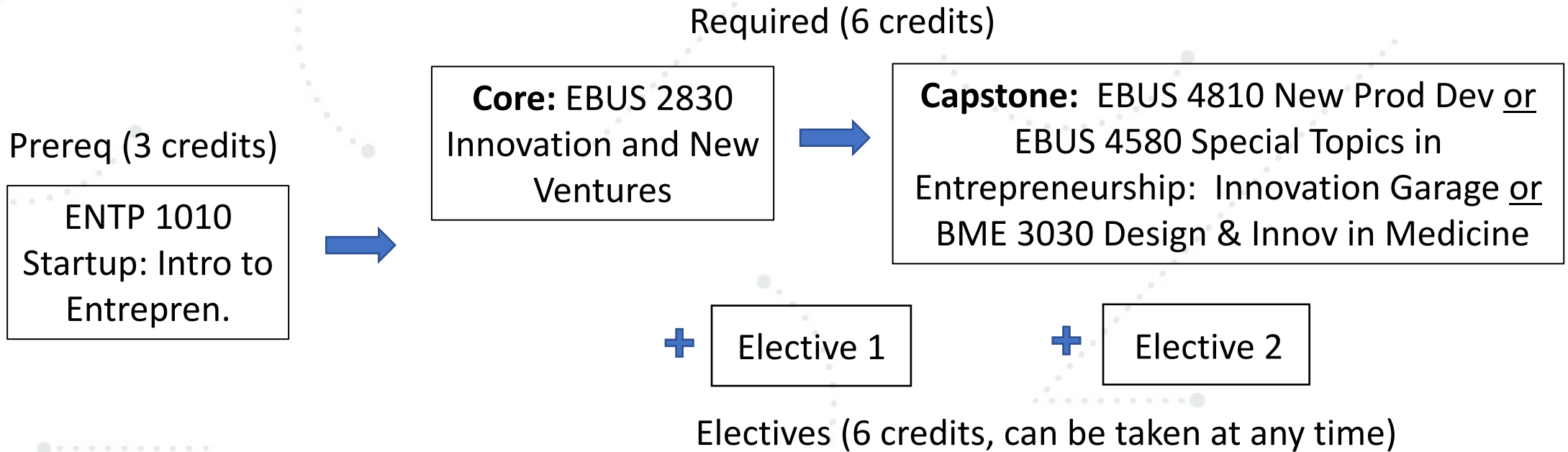
General Business Minor

- ✓ Provides general business foundational business knowledge
- ✓ Structured to accommodate students from the full array of schools and majors
- ✓ Elective list is maintained by McIntire

=> Best for students broadly interested in business and careers that include banking, general consulting, and non-technical industries

=> Can also be an option for students interested in technology-based businesses

Entrepreneurship Minor – Technology Concentration – 15 credits



Most Popular Electives (6 credits, choose from ~45):		Other EBUS and STS Electives
COMM 1800 Foundations of Commerce	PSYC 2600 Into to Social Psych	EBUS 1800 Business Fundamentals
COMM 2020 Intro to Mgt Acctg	ECON 3010 Inter Microeconomics	EBUS 2730 Engineers & the Art of the Deal
COMM 3420 Commercial Law II	EDLF 2050 Transforming Lives of Youth	EBUS 2840 Entrepreneurial Finance
		EBUS 2850 Government and Entrepreneurship
		STS 3020 Science & Tech Policy for Interns

Positioning of Revised EBM versus McIntire Entrepreneurship Minor



Engineering Business Minor

- ✓ Focused on product development, business building, and engineering management
- ✓ Tailored to engineering student curriculum and skills (e.g., strong quantitative and technical skills)
- ✓ Allows for electives that are appropriate only for engineering students

=> Best for students interested in engineering, product management, and working in technology-centric businesses

=> Can also be an option for students interested in technical consulting or advising tech businesses



Entrepreneurship Minor

- ✓ Focused on skills required to found a company with some coverage of corporate innovation
- ✓ Requires completion of an entrepreneurship capstone course
- ✓ Elective list is maintained by McIntire

=> Best for students who are interested in founding a startup (now or later)

=> Can also be an option for students interested in intrapreneurship

General Business Minor (15 credits)	New Engineering Business Minor (15 credits*)	Entrepreneurship Minor – Tech Concentration (15 credits)
3 credits COMM 1800 Foundations of Commerce	3 credits EBUS 1800 Business Fundamentals	3 credits ENTP 1010 Intro to Entrepreneurship
6 credits (4 x 1.5 credits) CGBM 2110 Accounting for Business CGBM 2210 Digital Skills for Workplace CGBM 2310 Marketing Principles CGBM 2710 Making Financial Decisions	6 credits (2 x 3 credits) EBUS 2830 Innovation & New Ventures EBUS 4810 New Product Development	6 credits (2 x 3 credits) EBUS 2830 Innovation & New Ventures EBUS 4810 New Product Development <u>or</u> EBUS 4580 Spec Topics: Innovation Garage <u>or</u> BME 3030 Design & Innov in Med
6 credits Choose from list of 10 courses	6 credits (2 x 3 credits)* Choose from list of ~25 courses, including discipline-specific courses	6 credits (2 x 3 credits) Choose from list of ~40 courses

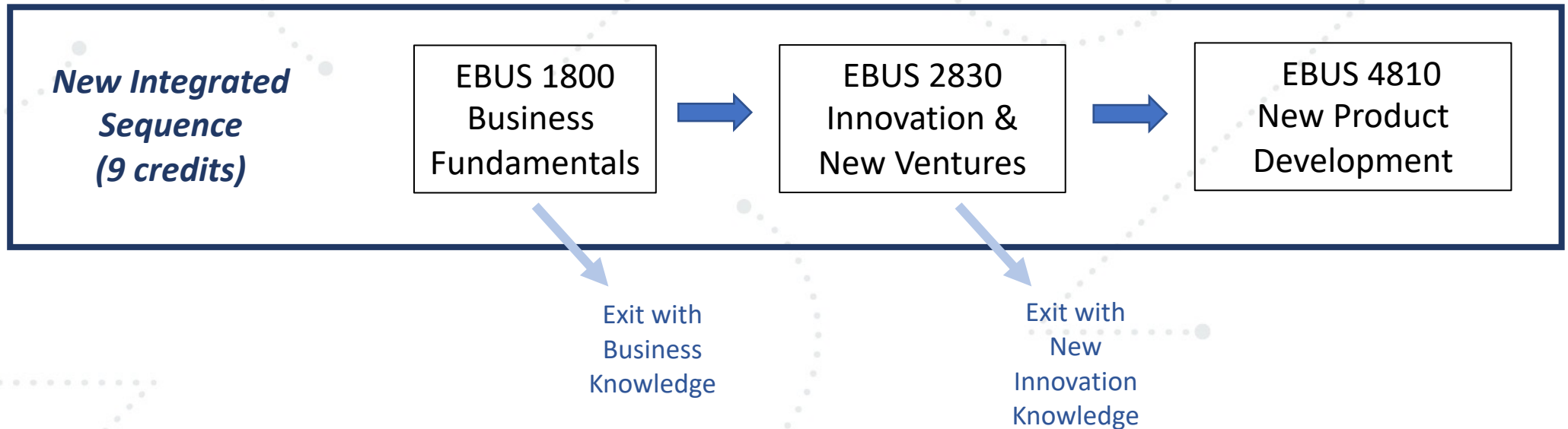
McIntire

Engineering School

**McIntire
+ E-School for Tech Track**

* Official approval still in process to reduce total credits from 18 to 15

The revised EBM's integrated sequence also provides a path for multiple learning paths, depending on student interest and schedule flexibility.



The new sequence also anchors either the new EBM or current Entrepreneurship Minor:

Proposed New Engineering Business Minor

- ✓ New sequence becomes core
- ✓ Add two electives*

Entrepreneurship Minor – Tech Conc.

- ✓ Add ENTP 1010 Intro to Entrepreneurship
- ✓ Add Tech Concentration capstone

* Seeking approval to reduce EBM's required hours from 18 to 15 by reducing the number of electives from three to two.

Whatever you pursue, remember:

**“Nothing great was ever achieved
without enthusiasm”**

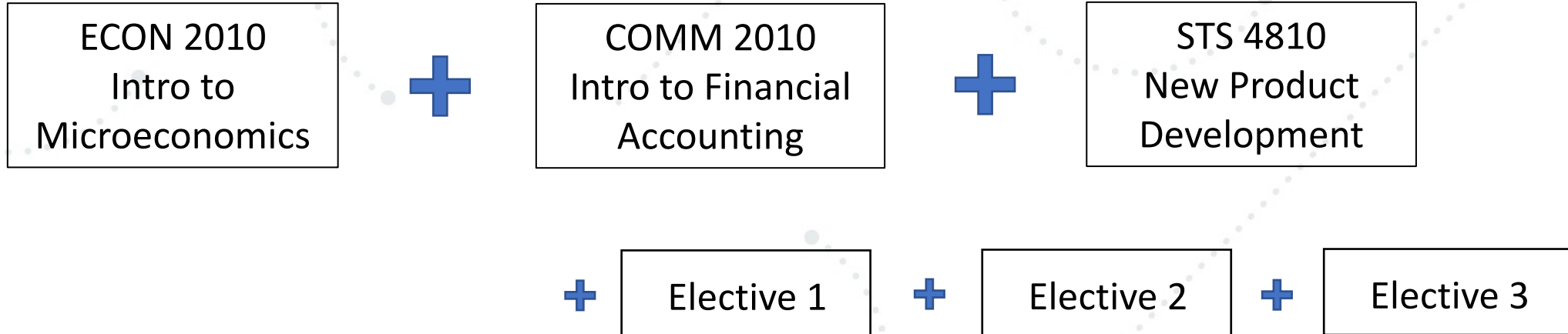
- Ralph Waldo Emerson



Appendix

Original Engineering Business Minor – 18 credits

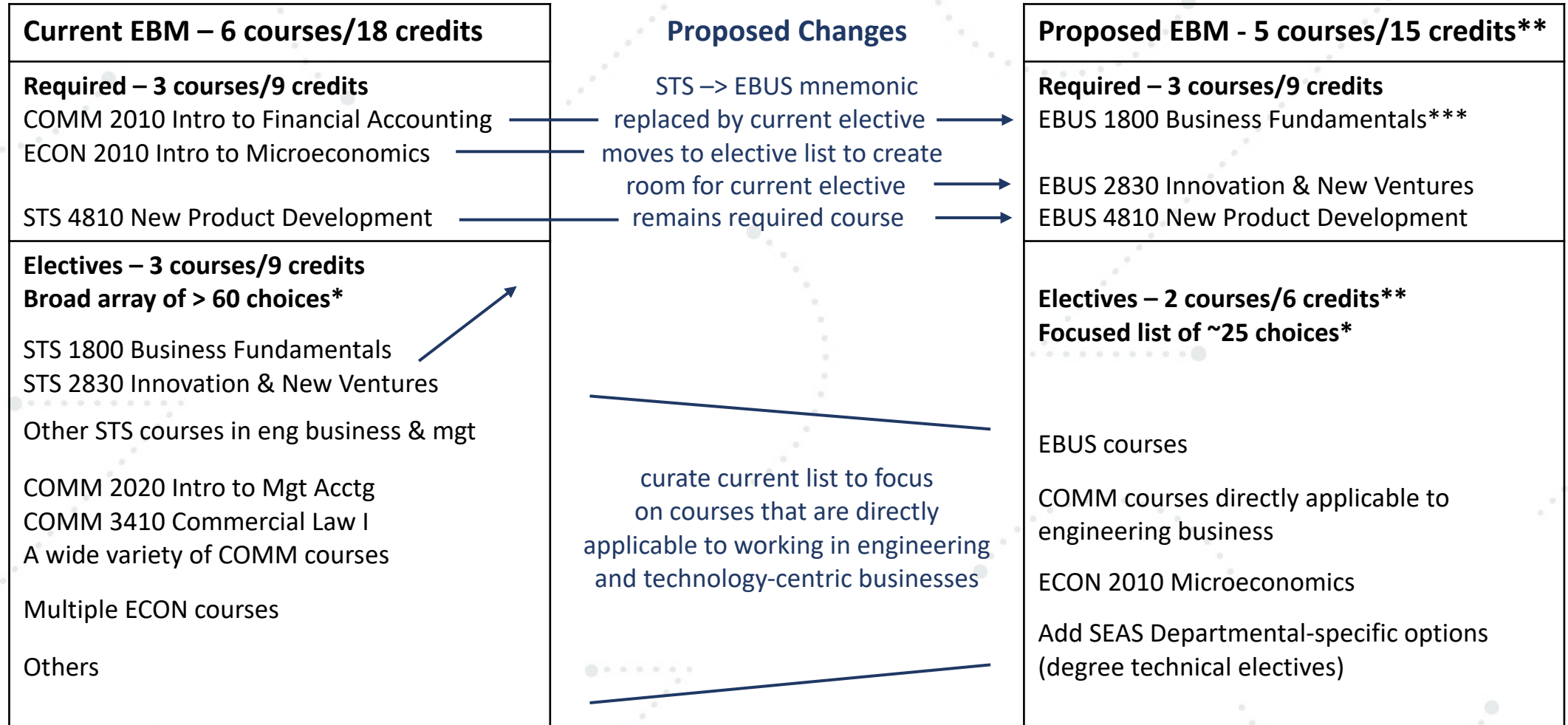
(must already be enrolled to pursue the EBM)



Most Popular Electives (choose from a list of dozens):

- COMM 2020 Intro to Mgt Acctg
- COMM 3410 Business Law
- ECON 2020 Macroeconomics
- ENTP 1010 StartUp: Intro to Entrp
- STS 2850 Gov't & Entrepreneurship
- STS 1800 Business Fundamentals
- STS 2840 Entrepreneurial Finance
- STS 2830 Innovation & New Ventures
- ECON 3030 Money & Banking

The new EBM leverages current course offerings to provide a minor that addresses the key learning objectives.



* See appendix for complete list

** Seeking approval to reduce required credits from 18 to 15

***Will become pre or co-requisite for higher level EBM courses

Current versus Revised EBM Electives – STS and EBUS Courses

Historic STS View

Subject	#	Title	Current	Revised	Comment
STS	1800	Business Fundamentals	X		Required in revised
STS	2580	Topics Engr Entrepreneurship	X	X	
STS	2620	Science & Tech Public Policy	X		
STS	2720	Marketing for Engineers	X		Not currently offered
STS	2730	Engineers & Art of the Deal	X	X	
STS	2740	Earth Systems Tech & Mgmt	X		Not currently offered
STS	2750	Engineers as Consultants	X		Not currently offered
STS	2760	Tech&Policy:Intent Meets Proc	X		
STS	2781	Making of the Machine Age	X		Not currently offered
STS	2810	Intro to Tech Entrepreneurship	X		Not currently offered
STS	2820	Presentatn Strategies Entrepren	X		Not currently offered
STS	2830	Innovation & New Ventures	X		Required in revised
STS	2840	Entrepreneurial Finance	X	X	
STS	2850	Government & Entrepreneurship	X	X	
STS	2860	Intellctl Prop Engr & Society	X	X	
STS	2870	Scientific & Technologcl Thkng	X		Not currently offered
STS	2880	Invention and Design	X		Not currently offered
STS	2890	The Entrepreneur in History	X		Not currently offered
STS	3020	Science and Technology Policy	X		
STS	3500	Adv Topcs Technology & Society	X		
STS	3570	Spec Topics: Leadership in Tech Sector	X	X	
STS	4580	Spec Topics: Innovation Garage	X	X	

Updated EBUS View

Currently Offered:

Subject	#	Title	Current	Revised	Comment
EBUS	1800	Business Fundamentals	X		Required in revised
EBUS	2730	Engineers & Art of the Deal	X	X	
EBUS	2830	Innovation & New Ventures	X		Required in revised
EBUS	2840	Entrepreneurial Finance	X	X	
EBUS	2850	Government & Entrepreneurship	X	X	
EBUS	2890	Driving Business Growth Through Innovation: Past to Present	X	X	Updated description
EBUS	3570	Spec Topics: Leadership in Tech Sector	X	X	
EBUS	4580	Spec Topics: Innovation Garage	X	X	
EBUS	4810	New Product Development	X		Required in revised

In Catalog but Not Currently Offered:

Subject	#	Title	Current	Revised	Comment
EBUS	2720	Product Marketing for Tech Businesses	X	X	Updated description
EBUS	2810	Intro to Tech Entrepreneurship	X	X	Updated description
EBUS	2820	Essential Communicationss for Entrepreneur	X	X	Updated description
EBUS	2860	Intro to Intellectual Property	X	X	Updated description
EBUS	2880	Invention and Design	X	X	Updated description
EBUS	2/3570	Special Topics in Engineering Business	X	X	As offered
EBUS	2/3/4580	Special Topics for Engr Entrepreneurship	X	X	As offered

Current versus Revised EBM Electives – SEAS Departmental Offerings

Subject	Nuber	Title	Current	Revised	Comment
APMA	3150	From Data to Knowledge	X	X	
BME	3030	Design & Innovation in Medicine		X	Approved Eship Minor
CE	2030	Mgmt of Eng & Construct Project	X	X	
CE	3010	Project Business Planning	X	X	
CS	4753	Electronic Commerce Technology	X		Not currently offered
ENGR	1559	Special Topics in Engineering	X		
ENGR	4880	Busi & Tech Leadership in Engr	X	X	Halsey Prof
SYS	2057	Mgmnt of E-Commerce Systems	X		Not currently offered
SYS	2620	Engineering Public Policy	X		
SYS	2054	Systems Case Studies	X	X	International courses
SYS	3054	Systems Case Studies	X	X	International courses
SYS	4000	Financial Aspects Engineering	X	X	
SYS	4044	Engr Economic Systems	X	X	
SYS	5044	Engineering Economic Systems	X		



Plan to expand approved list other relevant departmental options.

- Selected departmental courses that are closely related to product development and key business capabilities (e.g., innovation, design, and commercialization).
- Courses also satisfy technical elective requirements, helping students with accessibility of the minor (intentionally not selecting course specifically required by major).

Current versus Revised EBM - approved electives taught in the other Schools

Subject	#	Title	Current	Revised	Comment
COMM	2020	Intro Management Accounting	X		
COMM	2600	Leadership Across Disciplines	X	X	
COMM	3200	Project & Product Management	X	X	
COMM	3230	Managing Innovation		X	
COMM	3410	Commercial Law I	X	X	
COMM	3420	Commercial Law II	X		
COMM	3600	Prin & Prac in Arts Administrn	X		
COMM	3700	Markets and Investing	X		
COMM	3800	Business, Government & Society	X		
COMM	3810	Business Ethics	X		
COMM	3845	Foundations Intl Business	X	X	
COMM	3880	Global Sustainability	X	X	
COMM	4230	Fintech: Info Tech in Finance	X		Focuses on investing
COMM	4240	Electronic Commerce	X		Not currenty offered
COMM	4570	Topics in Finance	X		
COMM	4650	Business, Politics & Culture	X		
COMM	4660	Mgmt Consulting & Advisory Svc	X		
COMM	4821	Managing Sustainable Dev	X		
COMM	4822	Invest in Sustainable Future	X	X	
ENTP	1010	Intro to Entrepreneurship	X	X	

Subject	#	Title	Current	Revised	Comment
ECON	2010	Principles of Econ: Microeconomics	X	X	Required -> elective
ECON	2020	Principles of Econ: Macroeconomics	X		
ECON	2060	American Economic History	X		
ECON	3030	Money and Banking	X		
ECON	4210	Intl Trade: Theory & Policy	X		
ECON	4350	Corporate Finance	X		
HIST	3559	New Course: HIST	X		
LPPS	3440	Intro to Mgt Cosnulting & Strat Dec	X		
RELG	2630	Business Ethics and Society	X		
SOC	2600	Leadership Across Disciplines	X		

GBM versus Revised EBM - approved electives

Taught in the Engineering School

Subject	#	Title	GBM	New EBM	Comment
STS	1800	Business Fundamentals		Req	
STS	2730	Engineers & Art of the Deal	X	X	
STS	2830	Innovation & New Ventures	X	Req	
STS	2840	Entrepreneurial Finance		X	
STS	2850	Government & Entrepreneurship	X	X	
STS	3570	Spec Topics: Leadership in Tech Sector		X	
STS	4580	Spec Topics: Innovation Garage		X	
STS	4810	New Product Development	X	Req	
SYS	2/3054	Systems Case Studies - Argentina, Dubai		X	Requires GBM review
SYS	3054	Systems Case Studies - Sweden	X	X	

Note: STS courses will carry EBUS mnemonic starting in AY 24-25.

Taught in Other Schools

Subject	#	Title	GBM	New EBM	Comment
COMM	2020	Intro Management Accounting	X		
COMM	2600	Leadership Across Disciplines		X	
COMM	2730	Personal Finance	X		
COMM	3200	Project & Product Management		X	
COMM	3230	Managing Innovation		X	
COMM	3410	Commercial Law I	X	X	
COMM	3700	Markets and Investing	X		
COMM	3845	Foundations Intl Business		X	
COMM	3880	Global Sustainability		X	
COMM	4570	Finance and Society	X		
COMM	4560	Doing Business in China	X		
COMM	4822	Invest in Sustainable Future		X	
ENTP	1010	Intro to Entrepreneurship	X	X	Req for Eship Minor
ECON	2010	Principles of Econ: Microeconomics	X	X	
LPPS	3440	Intro to Mgt Consulting & Strat Decisions	X		

The limited number of Unrestricted Electives, will constrain a student's ability to complete the 18-credit EBM, which centers on EBUS and COMM classes.

Engineering School Degree Electives Credits Requirements

(source: January 2024 UVA Undergraduate Record)

Degree	Unrestricted Credits	HSS Credits	Degree-Specific Elective Credits
Aeronautical	9	9	6 Tech
Biomedical	12	9	6 Eng, 3 Tech, 9 BME
Chemical	9	9	3 Eng, 3 Tech, 6 CHE
Civil	9	9	12 to 18 CE and/or Tech (depends on conc.)
Computer Eng	12	9	15 ECE or CS
Computer Science	15	15	15 CS
Electrical	14	9	6 Tech, 18 ECE
Engineering Sci	9	9	TBD based on minors
Materials Science	9	9	6 Tech, 15 MSE
Mechanical	9	9	6 Tech
Systems	9	9	3 Tech, 9 Application Sequence
Relevant EBM course codes	EBUS, COMM	ECON	Depends on degree program, SEAS course codes

There is an overlap between E-School-taught business and tech entrepreneurship minor courses.

Course	Old EBM	GBM	EShip	New EBM	Comments
EBUS 1800 Business Fundamentals	Elective		Elective	Required	
EBUS 2730 Engineers & the Art of the Deal	Elective	Elective	Elective	Elective	
EBUS 2830 Innovation & New Ventures	Elective	Elective	Required*	Required	Was "Startup Ops for Engineers"
EBUS 2840 Entrepreneurial Finance	Elective		Elective	Elective	
EBUS 2850 Government & Entrepreneurship	Elective	Elective	Elective	Elective	
EBUS 2890 Driving Growth Through Innovation: Past to Present	Not offered		Proposed Elective	Elective	
EBUS 4810 New Product Development	Required	Elective	Capstone choice**	Required	Now more oriented towards product mgt vs capstone lite
EBUS 3570 Special Topics in Engineering Business: Leadership in the Tech Sector	Elective		Proposing as elective	Elective	Was STS 2500 Leadership in Context. Proposing as new course.
EBUS 4580 Special Topics for Engineering Entrepreneurship: Innovation Garage			Capstone choice**	Elective	Proposing as new course with its own code

* Required for Tech Entrepreneurship track

** Plan to encourage students to take EBUS 4580 for capstone once offered