KGI HENRY E. RIGGS SCHOOL OF APPLIED LIFE SCIENCES

Class of 2024, 2025 Graduation Requirements

# Master of Business & Science (MBS)

To earn the MBS degree, students are required to complete the following coursework:

- Core curriculum (25.5 credits)
- Business (6.0 credits) and technical (6.0 credits) electives beyond core classes
- Data analytics (3.0 credits)
- TMP (12.0 credits)
- Other courses to total 60 credits (average 15.0 credits/semester)

Students are also required to complete a 400-hour, paid, industry internship in the summer following their first year, and present an internship poster reviewed by KGI faculty.

### Year 1 Core Curriculum

| Fall Courses | Credits |
|---|---|
| BUS 5000 Intro. to Bioscience Industries | 3.0 |
| BUS 5100 Financial Accounting | 1.5 |
| BUS 5200 Healthcare Economics | 1.5 |
| PDEV 5100 Professional Development | 0.0 |
| REG 5000 Intro. to US Food and Drug Law | 1.5 |
| SCI 5000 Molecular Biotechnology | 1.5 |
| SCI 5300 Pharmaceutical Discovery | 1.5 |
| SCI 5310 Pharmaceutical Development | 1.5 |
| SCI 5700 Medical Diagnostics | 3.0 |
| Subtotal | **15.0** |

| Fall Courses | Credits |
|---|---|

| Spring Courses | Credits |
|---|---|
| BUS 5110 Corporate Finance | 3.0 |
| BUS 5300 Competitive Strategy | 1.5 |
| ENG 5160 Introduction to Bioprocessing | 1.5 |
| ENG 5300 Medical Devices | 3.0 |
| PDEV 5220 Healthcare/Life Sci. Ethics | 1.5 |
| Subtotal | **10.5** |

In Spring semester, students also take 4.5-7.5 credits of elective courses

### Year 2 Course Requirements

- *Fall TMP*: PDEV 6000: Team Master's Project (6.0)
- *Spring TMP*: PDEV 6000: Team Master's Project (6.0)

Specific elective requirements:

- *Data analytics:* a total of 3.0 credits from among MATH 5020-6510 or GENE 5120
- *Business courses:* a total of 6.0 credits from BUS classes (excluding core classes)
- *Technical courses*: a total of 6.0 credits from ENG, MATH, REG, SCI (excluding core classes) or approved SPHS classes

### Independent Study/Independent Research

Independent research (RES 6000, 6001) and independent study (RES 6010, 6011) are conducted under the supervision of one or more faculty members.

First year students can choose independent study or research as an elective for the spring if their fall GPA is above 3.25. No more than 3.0 credits of IS/IR will count toward graduation for all MBS students. Students may enroll in 1.5 or 3.0 credits per semester. To enroll in IS/IR, the student must complete the Independent Study/Research Contract and return it to the Registrar's Office before the last day to Add courses. Independent study is acquiring skills, knowledge, or information that is known among professionals; independent research is work that generates novel techniques, knowledge, or synthesis of information.

### Other Policies

*Concentrations.* Students are encouraged (but not required) to designate a career-specific concentration. Each concentration requires completing a total of 18 credits of required and elective courses, as shown on the following pages; concentration classes can also count towards the data analytics, business or technical requirements. With permission of the Program Director, up to 3.0 elective credits for independent research or study can be counted as a concentration elective, if the topic is directly related to the concentration.

*Safety Training.* Two concentrations (BP,PDD) require laboratory courses and thus completion of KGI laboratory safety training. This is also required for students who take specific laboratory classes.

*CGU/Drucker Courses.* Students may substitute up to four credits at CGU (including Drucker) to count as up to three KGI credits; this is the maximum number of credits that can be applied to meet any graduation requirements. In most cases, prerequisites for Drucker courses cannot be waived or substituted. All Drucker courses and some other CGU courses are designated as business courses, and these business courses count can count towards the 6.0 credits of business electives and the BTM concentration. **All registration for Drucker courses must originate with the KGI registrar; do not directly contact the Drucker instructor or registrar.**

*Courses in Other KGI Schools.* Any GENE or PHAR course listed in this document counts towards the MBS total credit requirement and counts as a technical course. Other non-Riggs courses may be taken (with instructor permission) but do not count towards graduation.

### Academic Petitions

The **Program Director** must sign a petition for certain requests, such as the following:

- Course overload: permission to take more than 18 credits in Year 1 or 19.5 credits in Year 2
- MBS students requesting part-time status (less than 12 credits/semester)
- Exceptions for course prerequisites (also requires instructor approval)
- Exceptions to registration deadlines (late Add or Drop)
- Exceptions to cross registration and general education requirements
- Substitution for a required or elective concentration course, including counting independent study or independent research towards as a concentration elective
- Exceptions to graduation requirements or other KGI academic policies

Request for course exceptions or substitutions should be submitted in advance. Please follow the instructions for Academic Petitions on the Registrar's "Forms and Documents" page.

**Required** and elective classes

## BP: Bioprocessing (9+6)

**ENG 5100: Bioprocess Engineering Principles (1.5)**
**ENG 5120[¶]: Microbial Fermentation (1.5)**
**ENG 5130[¶]: Mammalian Cell Biotechnology (1.5)**
**ENG 5131[†]: Mammalian Cell Culture Lab (1.5)**
**ENG 5140[¶]: Bioseparations Engineering and Science (1.5)**
**ENG 5141[†]: Introduction to Bioseparations Engineering Lab (1.5)**

### Electives

BUS 6600: Business Operations (3.0)
BUS 6610: Supply Chain Biotech Operations (3.0)
BUS 6730: Applied Entrepreneurship (3.0)
ENG 5121: Microbial Fermentation Lab (1.5)
MATH 5110: Biomedical Signal Processing (1.5)
MATH 5130: Data Analytics for Bioprocessing (3.0)
REG 5310: Biopharmaceutical Quality System Regulation and Controls (1.5)
SCI 6310: Biotechnology-Based Therapeutics (3.0)

## BTM: Biotech Management (9+6)

**BUS 6400: Organizational Behavior (3.0)**
**BUS 6500: Marketing Management (3.0)**
**BUS 6600: Business Operations (3.0)**

### Electives

BUS 6120: Valuation in the Life Sciences (1.5)
BUS 6210: Advanced Healthcare Economics (1.5)
BUS 6220: Drug Pricing and Reimbursement (1.5)
BUS 6230: Global Health Policy (1.5)
BUS 6310: International Business (1.5)
BUS 6320: Managing Strategic Alliances (1.5)

[¶] ENG 5100 is prerequisite
[†] Among MBS students, only those in BP concentration can enroll

# Concentrations

BUS 6330: Intellectual Property Strategy (1.5)
BUS 6410: Leadership in Organizations (1.5)
BUS 6610: Supply Chain Biotech Operations (3.0)
BUS 6710: Biotechnology Entrepreneurship (1.5)
BUS 6720: Digital Innovation in Healthcare (3.0)
BUS 6730: Applied Entrepreneurship (3.0)
MATH 5100: Data Analytics in Python (1.5)
MATH 6510: Market Analytics (1.5)
PHAR 7563: Fundamentals of Medical Affairs (1.5)

## CRA: Clinical/Regulatory Affairs (9+6)

**MATH 5020: Clinical Biostatistics (3.0)**
**REG 5310 Biopharmaceutical Quality System Regulation and Controls (1.5)**
**REG 6110: Drug and Biologic Regulations (1.5)**
**REG 6120: Medical Device Regulations (1.5)**
**REG 6510: Design of Clinical Trials (1.5)**

### Electives

BUS 6210: Advanced Healthcare Economics (1.5)
BUS 6220: Drug Pricing and Reimbursement (1.5)
BUS 6610: Supply Chain Biotech Operations (3.0)
ENG 6350: Medical Device Production (3.0) *(May be substituted for REG 5310)*
REG 6020: Current Issues for FDA Regulated Products (1.5)
REG 6520: Clinical Trial Design and Literature Evaluation (3.0)
SCI 6310: Biotechnology-Based Therapeutics (3.0)

## HCE: Healthcare Economics (6+9)

**BUS 6210: Advanced Healthcare Economics (1.5)**
**BUS 6220: Drug Pricing and Reimbursement (1.5)**
**MATH 5020: Clinical Biostatistics (3.0)**

### Electives

BUS 6230: Global Health Policy (1.5)
BUS 6330: Intellectual Property Strategy (1.5)

BUS 6400: Organizational Behavior (3.0)
BUS 6410: Leadership in Organizations (1.5)
BUS 6730: Applied Entrepreneurship (3.0)
PHAR 7563: Fundamentals of Medical Affairs (1.5)
REG 6110: Drug and Biologic Regulations (1.5)
REG 6120: Medical Device Regulations (1.5)
REG 6510: Design of Clinical Trials (1.5)
REG 6520: Clinical Trial Design and Literature Evaluation (3.0)
SCI 6100: Pharmacogenomics and Precision Medicine (1.5)
SCI 6110: Advanced Pharmacogenomics and Precision Medicine (1.5)
SCI 6600: Infectious Disease Epidemiology (3.0)

## MDD: Medical Devices and Diagnostics (7.5+7.5)

**BUS 6600: Business Operations (3.0)**
**REG 6120: Medical Device Regulations (1.5)**
Plus one (or both) of the following

- ENG 6340: Device and Diagnostic Product Development (3.0)
- SCI 6700: Advanced In-Vitro Diagnostics (3.0)

### Electives

BUS 6330: Intellectual Property Strategy (1.5)
BUS 6710: Biotech Entrepreneurship (1.5)
BUS 6730: Applied Entrepreneurship (3.0)
ENG 5320: Computer Aided Design (1.5)
ENG 5330: Prototyping Methods (1.5)
ENG 6310: Drug Delivery Devices (1.5)
ENG 6320: Biosensors (1.5)
ENG 6350: Medical Device Production (3.0)
MATH 5100: Data Analytics in Python (1.5)
MATH 5110: Biomedical Signal Processing (1.5)
MATH 5220: Data Analytics in R (1.5)
MATH 5300: Machine Learning in the Life Sciences (1.5)
REG 6510: Design of Clinical Trials (1.5)
SCI 6710: Technologies for Biomarker and Drug Discovery (1.5)

## PDD: Pharmaceutical Discovery and Development (9+6)

**SCI 6100: Pharmacogenomics and Precision Medicine (3.0)**
**SCI 6300: Advanced Pharmaceutical Discovery (1.5)**
**SCI 6301: Advanced Pharmaceutical Discovery Lab (1.5)**
**SCI 6310: Biotechnology-Based Therapeutics (3.0)**

### Electives

BUS 6210: Advanced Healthcare Economics (1.5)
BUS 6220: Drug Pricing and Reimbursement (1.5)
BUS 6330: Intellectual Property Strategy (1.5)
BUS 6730: Applied Entrepreneurship (3.0)
GENE 5120: Bioinformatics in Python (1.5)
GENE 5240: Genetic Disease Mechanisms (1.5)
GENE 6446: Genetic Engineering (1.5)
MATH 5020: Clinical Biostatistics (3.0)
MATH 5100: Data Analytics in Python (1.5)
REG 6510: Design of Clinical Trials (1.5)
SCI 5210: Clinical Pharmacology I (3.0)
SCI 5220: Clinical Pharmacology II (3.0)
SCI 6500: Virology (1.5)
SCI 6510: Medical Microbiology and Infectious Diseases (1.5)
SCI 6700: Advanced In-Vitro Diagnostics (3.0)
SCI 6710: Technologies for Biomarker and Drug Discovery (1.5) *(May be substituted for SCI 6310)*