MGT490-002 Pre-Immersion: Biotechnology

(1 Unit) Fall Quarter 2021 – CRN #53941

Instructor Info: Dr. Denneal Jamison-McClung, Director, UC Davis Biotechnology Program
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Office Hours—by appointment*

Lecture Time: Mondays in November (1, 8, 15, 22, 29), 10:00am-11:50am

Lecture Location: 1302 Gallagher Hall: class will be held in this discussion room. While we will not have an official option for remote participation, the slides and audio for each class session will be available upon request for students who have an excused absence (e. g. required COVID19 isolation due to exposure). Be sure to check the Canvas announcements each week for course updates.

Course Description and Format:

The Pre-Immersion Biotechnology course will introduce the fundamentals of cell and molecular biology that underlie many biotech innovations currently on the market. In addition, students will explore current trends in bioprocessing, personal genomics, and other biotech-related fields. We will also touch on the key innovation system players who make translational research in biotechnology possible. This course will be designed for students without a deep knowledge base or technical background in biotechnology. Small group activities and discussions, in addition to lecture material, will help to build familiarity with key biotech terms and concepts.

As with all campus courses, students are expected to abide by the UC Davis Code of Academic Conduct, which can be found at: Office of Student Support and Judicial Affairs - Code of Academic Conduct (ucdavis.edu). For more information on campus COVID19 policies, please see: Campus Ready (ucdavis.edu).

MGT490 Fall Quarter 2021 Lecture Schedule (*may be subject to minor topic area modifications*)

- November 1 – Introduction to Biomolecules and Platform Technologies
- November 8 – Bioprocessing Technologies
- November 15 – Personal Genomics and Precision Medicine
- November 22 – Food Science, Agriculture and Environmental Sustainability
- November 29 – Biotech Innovation Systems

MGT490 Assignments, Grading and Attendance Policies:

Assignments (Total – 150 points)

1) 50 points – Daily class participation and/or submission of a short in-class assignment (10 points x 5 days).
2) 100 points – A **final ~3-4-page writing assignment** (single-spaced, ~1" margins, ~11-12 pt font) will be due via Canvas submission (.docx, .pdf) by Dec 10 at 11:59pm. Students will be asked to investigate a **biotech innovation area** and **profile two or more companies** working within this area. Use the following topic areas and questions to guide foundational research and outline the paper:

Introduction – What are the key drivers for the existence of this biotech innovation area? In other words, what value does this biotech sector bring to the broader public and the world – what big challenge are they trying to tackle? Are there any similarities or differences in the mission and/or vision statements of the profiled companies or in their overall approaches to the challenges at hand?

Human Resources – What is the composition of the investigated company leadership teams or C-suite officers (titles, demographics, responsibilities)? Who do these companies hire? - Describe the level of training/academic degrees held by the majority of employees and any variation in training across R&D vs production facilities vs business functions. How large are the total company workforces and where in the world are they located? Are there any current workforce issues negatively impacting the overall innovation area or specific companies?

Research and Development – What fundamental biological knowledge or engineering know-how informs the work of this biotech sector? Are there specific research approaches, specialized equipment, and/or data analysis platforms commonly used by companies working in this biotech space (e. g. DNA sequencing, FACS cell sorting, CRISPR gene editing)? Have there been any recent technological advances that accelerate R&D in this innovation area? Are there any publicly acknowledged R&D challenges slowing down work in this innovation area?

Technoeconomic and Market Considerations – Are there any current challenges or bottlenecks to bringing products to market (e. g. access to research or production facilities, raw materials, supply chains/distribution)? What types of material resources go into making products in this innovation area and how much do they cost? Overall, what is the greatest R&D or production expense (e. g. media cost for bioprocessing)? Which types of process improvements do companies in this innovation area focus on in order to reduce the final cost of goods sold (COGS)? What seems to be the relationship, if any, between investment in R&D and COGS? What fraction of expenses are related to R&D and production vs. typical business-related costs (regulatory, intellectual property management, packaging, sales and marketing)? What are some of the historical and current economic performance indicators for this biotech innovation area and/or the profiled companies (e. g. industry growth, company stock valuations, annual gross/net profit margins)?

Innovation System Considerations – Who funds early vs. later stage research and development in this area? Do public-private partnerships or government funding typically play a role in getting new technologies launched? Which government regulatory agencies, intellectual property strategies, and translational research practices are involved in moving biotech innovations from the lab bench to the clinic or marketplace? Are there geographic locations where companies in this innovation space are clustered together and, if so, how did these regional clusters emerge? Who are the end-users or final consumers of these biotech products and is there any public controversy or push-back on the marketed technologies? Are there generic, publicly-funded or "open science" alternative products or services that are less costly? Are there any industry trade organizations or consumer-focused non-governmental organizations (NGOs) working to influence policies and regulatory paradigms governing these products?

Conclusion – What is your general forecast for the growth of this biotech innovation area and development of new technologies, services or products? Would you consider launching a start-up or working for a company in this technology space? – Why or why not? Did you learn anything new or surprising about the biotech industry while researching this paper topic?

References – Please list ~3-5 or more references used to inform the writing assignment (APA, MLA, or other readable citation format is okay). The reference page will not be included in the writing assignment page count, so it may be as long as needed. References may include any sources that professionals in this biotech innovation area might use to inform decisions: company websites or annual reports, government or NGO reports, trade journals, media articles or videos, and traditional academic journal articles.

Please format the writing assignment with clearly labelled paragraphs or sections that correspond to the topic headers listed above (Introduction, Research and Development, Human Resources, etc...). Students may not be able to address all of the questions in each topic section and that is okay. If information is not available or easy to locate for a particular question, just skip that one. Students are welcome to add other information to these topic sections based on current facts and forecasts uncovered while researching the innovation area.

Grading

For enrolled MBA students, this course will be letter graded: Letter Grades | Office of the University Registrar (OUR) (ucdavis.edu). The earned percentage of 100 available points will be calculated and a final letter grade assigned using this standard grading scale: A+ (100%), A (93-99%), A- (90-92%), B+ (87-89%), B (83-86%), B- (80-82%), C+ (77-79%), C (73-76%), C- (70-72%), D+ (67-69%), D (63-66%), D- (60-62%) and F (</=59%).

Attendance

A sign-in sheet will be available each day of class and students will be expected to attend all five days of instruction. In the event of an unavoidable "excused" absence (e. g. COVID19 exposure and required isolation), audio recordings and slides will be available for review.