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SPECIALIZED CERTIFICATE IN DIGITAL HEALTH:

Data Science for Digital Health Syllabus

**Course 2: Data Science for Digital Health**

Course Number: GLBH-40021

Section ID: 143854

Course Start Date: 01/06/2020

Course End Date: 03/29/2020

**Instructor Information**

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Communication Policy: Contact me for immediate response Tuesdays 10:00-11:30pm PST

**Welcome**

Welcome to the Data Science Digital Health online course. I hope you're as excited as I am to explore all the ways that Data Science can be used to advance health care, improve outcomes, and even save lives! Don't worry if you've never used statistics to predict the future or programmed a deep learning model using a programming language like python. We'll show you how to use whatever tools you are familiar with to take advantage of all the amazing developments in Data Science. You can use a spreadsheet program like Libre Office or Excel. And if you prefer to automate your work, you'll see how to use the python language open source tools to go even further, implementing state of the art Data Science and Machine Learning models. Regardless of your tool choice, you will come away from this course with an ability to teach machines how to find patterns in data and learn new things yourself about medicine and health care from those patterns.

**Course Description and Goals**

This is the second course of the Digital Health Specialized Certificate. The course has been crafted by experts with deep experience in applying data science to health care. And because this field is evolving so rapidly, we prepared this material in an \*agile\*, just in time fashion. And you will be able to contribute your ideas and experiences during this course to help us improve it and keep it up to date.

**Course Purpose and Prerequisites**

Intended for those with a background or interest in healthcare transformation, data science, eHealth, public health, IT administration, engineering and regulatory affairs.

**Course Objectives**

Upon completion of this course, the student will be able to:

* Build a strong foundational knowledge of the impact of Digital Health on the healthcare ecosystem;
* Apply critical thinking to understand the evolving Digital Health industry;
* Recognize and assess different opportunities for innovation and disruption in the digital health sector;
* Describe the multi-disciplinary Digital health domain and navigate the different roles of healthcare providers, behavioral psychologists, data scientists, technologists, social scientists, and public health professionals

**Course Materials/Textbooks**

**Course Overview**

This course has 10 sessions. The topics are as follows:

Session 0: **Lecture 0: Introduction to the Course**

Session 1: **Lecture 1: Data Science in Healthcare**

Session 2: **Lecture 2: Spreadsheet Data Science**

Session 3: **Lecture 3: Statistics, Privacy, Ethics**

Session 4: **Lecture 4: Clinical Data Science & Machine Learning**

Session 5: **Lecture 5: Deep Learning & AI**

Session 6: **Lecture 6: Hospital Performance Modeling**

Session 7: **Lecture 7: Population Health (Epidemiology)**

Session 8: **Lecture 8: Healthcare Public Policy and Research**

Session 9: **Lecture 9: Natural Language Processing**

Session 10: **Lecture 10: Bioinformatics**

**Online Course Structure**

The course is organized using the course menu:

* **Announcements:** This is the first page you see upon entering your course. Your instructor will post weekly announcements and reminders here.
* **Introduction:** Contains an introduction to the course and instructor biography.
* **Syllabus:** Contains the course outline, learning objectives, weekly assignments and course details.
* **Lessons:** This section will have the instructor’s weekly audio/image lectures. The lectures are self-paced and can be replayed anytime like a video or movie.
* **Discussion Board** Questions pertaining to each lesson are posted weekly for you and your classmates to discuss and answer.
* **Assignments:** Exercises will include python programming assignments in Jupyter notebooks (online resources provided) for data manipulation, visualization, and predictive analytics). Quizzes and a final exam will allow you to measure your progress and reinforce your learning. You will also be able to provide feedback to the instructor and university in a course evaluation.
* **Resources:** Additional readings and handouts, web site links, and PowerPoint presentations are provided here.

**Technical and Policy Memo**

**Course Sessions, Assignments, and Due Dates**

The topics are as follows:

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| **Week** | **Assignments** | **Points** |
| 0 | **View lecture 1: Introduction to Course and Certificate**  Assignment #1: Discussion Board | Discussion board: **5 points** |
| 1 | **View lecture 1: Digital Health Landscape**  Assignment #2: Discussion Board  **RR1:** Digital Health: Scaling Healthcare to the World – Chapter 1 and 18 **RR2:** A digital (r)evolution introducing The Lancet Digital Health **RR3:** WHO Telemedicine 2010 **RR4:** Finding the Missing Link for Big Biomedical Data **SR1:** Deloitte Medtech and the Internet **SR2:** FDA Innovation Action Plan **SR3:** What Is eHealth (4):A Scoping Exercise to Map the Field | Discussion board: **5 points** |
| 2 | **View lecture 2: Data Science for Digital Health**  Assignment #3: Discussion Board  **RR5:** Digital Health: Scaling Healthcare to the World – Chapter 5  **RR6:** Machine Learning for Healthcare: On the Verge of a Major Shift in Healthcare Epidemiology  **RR7:** Lead Exposure and Behavior: Effects on Antisocial and Risky Behavior among Children and Adolescents  **SR4:** America’s Real Criminal Element | Discussion board: **5 points** |
| 3 | **View lecture 3: Connected Health**  **RR8:** Digital Health: Scaling Healthcare to the World – Chapter 2 & 3 | Quiz: **20 points** |
| 4 | **View lecture 4: User Experience Design**  Assignment #5: Discussion Board  **RR9:** Digital Health: Scaling Healthcare to the World – Chapter 4, 12, & 19 **SR5:** | Peer Review: **25 points**  Discussion board: **5 points** |
| 5 | **View lecture 5: Health Behavioral Change and Wellness Apps**  Assignment #6: Discussion Board  **RR10:** Digital Health: Scaling Healthcare to the World – Chapter 4 **RR11:** The history and future of digital health in the field of behavioral medicine **SR7:** Prescribable mHealth apps identified from an overview of systematic reviews **SR8:** The Impact of mHealth Interventions\_Systematic Review of Systematic Reviews | Discussion board: **5 points** |
| 6 | **View lecture 6: Digital Pharmacy**  Assignment #3  **RR12:** Digital Health: Scaling Healthcare to the World – Chapter 4  **RR13:** Le 2018  **RR14:** ATHSP, Flynn 2019  **SR 9**: ASHP Statement | Discussion board: **5 points**  Quiz: **20 points** |
| 7 | **View lecture 7: Digital Health in an Era of Genomics**  **RR15:** Digital Health: Scaling Healthcare to the World – Chapter 14  **RR16:** Direct-to-Consumer Genetic testing:  A Comprehensive View **SR10:** Understanding FDA Regulation of DTC Genetic Tests  **SR11:** A Commentary on Commercial Genetic Testing and the Future of the Genetic Counseling Profession | Discussion board: **5 points** |
| 8 | **View lecture 8: Frontier Technologies: The “Health” Blockchain**  **RR17:** Blockchain for Dummies  **RR18:** Blockchain distributed ledger technologies for biomedical and health care applications **RR19:** Fit-for-purpose?’ – challenges and opportunities for applications of blockchain technology in the future of healthcare **SR12:** Leveraging Blockchain Technology to Enhance Supply Chain Management in Healthcare: An Exploration of Challenges and Opportunities in the Health Supply Chain | Discussion board: **5 points** |
| 9 | **View lecture 9: Digital Health Industry Overview**  **RR20:** Digital Health: Scaling Healthcare to the World – Chapter 19  SR14: | Discussion board: **5 points** |
| 10 | **View Lecture 10: Policy and Technology Memo Instructions**  Reading 18: Digital Health: Scaling Healthcare to the World – Chapter 21 & 22 | Discussion board: **5 points**  Policy and Technology Memo Instructions: **90 points** |
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