## Digital Transformation - 95-722
Carnegie Mellon University - Master of Information Systems Management Program

**Instructor:**
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*Office Hours:* 30 minutes following each class (in person or teleconference)

**Teaching Assistant(s):**
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**Heinz Academic calendar: https://www.heinz.cmu.edu/heinz-shared/_files/img/current-students/heinz-college-academic-calendar-2023-24.pdf**

**Course Prerequisites:**

> Students should have taken graduate courses that cover both information technology (Core IT Design/Development/Management/Analytics, etc.) and business/managerial topics (Financial management, business analytics, economic analysis, etc.). **No firm pre-requisites are required.**

**Course Description:**
This course serves as a capstone course integrating technological and managerial aspects of information technology. We will take the culmination of your previous learning of technological and managerial subjects and apply it to real-world scenarios. Each section will consider the information and communication technologies that play multiple roles within an organizational context through several perspectives:

- From a **technological perspective**, these define the information and communication infrastructures of the firm and how they enable new ways to digitize business processes.

- From a **managerial perspective**, these facilitate the new coordination and communications within and across entities, enabling new organizational forms, changing the information environment underlying the business, and permitting new incentive structures.

- From a **policy perspective**, these new coordination and communication processes, new organizational forms, new modes of cross-organizational interaction, and new incentive & monitor structures that frequently challenge established policy and regulatory structures, which can also lead to the potential for regulation to undermine these new and existing processes.

Successful efforts at digitization must keep both technological & managerial perspectives in mind. Using a collection of cases and current industry scenarios, this course will study how deployment of information technology changes interactions & processes within organizations, across organizations, within industries, and across society.

The analyses of the different organizations and industries will require students to engage in both technical and managerial problem-solving. The technical component of the analysis requires students to propose IT architectures for the problems highlighted in the case. The managerial component of the analysis requires students to analyze the business value of the proposed solution and address the change management issues that arise in implementing any digital transformation initiative.

**High-Level Learning Objectives and Outcomes:**

- Analyze and interpret transformations of IT in the four areas of competitive advantage, org structure, industry structure, and institutional policy.

- Analyze and interpret methods of productivity growth through modern interpretations of digitized input and output drivers.

- Distinguish between and systematically assessing components of change through sustaining and disruptive technologies with proper management of demand and supply-side drivers.

- Identify and examine key technological challenges and rewards from systems innovations, first-mover advantages and disadvantages, and the potential disruptions or opportunities to culture, cross-industry collaborations, design thinking, and trust.

**Reading Materials:**

A "digital" reading packet containing most of the cases and readings for this course is available from HBS Publishing. Details & a link to HBS case studies is listed on Canvas.

Supplemental readings are available on Canvas and/or will be distributed in class. There is no textbook requirement.

**Attendance Policy:**

Students are expected to attend & participate in scheduled <u>mandatory</u> classes. As most classes involve team-based work including live presentations, it's imperative students are a part of each discussion. Any meeting not deemed mandatory are <u>optional</u> attendance.

**Cheating, Plagiarism, and Academic Integrity:**

Students at CMU are engaged in preparation for professional activity of the highest standards. Each profession constrains its members with both ethical responsibilities and disciplinary limits. To assure the validity of the learning experience Carnegie Mellon establishes clear standards for student work. You are required to be familiar with all university policies on the subject (see http://www.cmu.edu/policies/documents/Cheating.html). An extract of these policies is reproduced here:

In any presentation, creative, artistic, or research, it is the ethical responsibility of each student to identify conceptual sources of work submitted. Failure to do so is dishonest & is the basis for a charge of cheating or plagiarism, which is subject to disciplinary action.

Cheating includes but is not necessarily limited to:

- Plagiarism, explained below.
- Submission of work that is not the student's own: papers, assignments, exams, etc.
- Submission or use of falsified data.
- Theft of or unauthorized access to an exam or quiz.
- Use of an alternate, stand-in or proxy during an examination.
- Use of unauthorized material including textbooks, notes or computer programs in the preparation of an assignment or during an examination.
- Supplying or communicating in any way unauthorized information to another student for the preparation of an assignment or during an examination.
- Collaboration in the preparation of an assignment. Unless specifically permitted or required by the instructor, collaboration will usually be viewed by the university as cheating. Each student, therefore, is responsible for understanding the policies of the department offering any course as they refer to the amount of help and collaboration permitted in preparation of assignments.
- Submission of the same work for credit in two courses without obtaining the permission of the instructors beforehand.

Plagiarism includes, but is not limited to, failure to indicate the source with quotation marks or footnotes where appropriate if any of the following are reproduced in the work submitted by a student:

- A phrase, written or musical.
- A graphic element.
- A proof.
- Specific language.
- An idea derived from the work, published or unpublished, of another person.

Regarding plagiarism, you should also familiarize yourself with the content of the separate handout entitled "A Note on Plagiarism and Citing Sources."

*One application of this plagiarism policy for our class is that you may <u>not</u> provide or receive information on case write-ups or class discussions from students outside of your section. This includes both students from prior and current DT sections & semesters.*

### A Note Regarding Case "Solutions" on the Web

These cases are used at a variety of school. There may be slides & other materials available for them on the web. I am asking you not to use these materials for the following reasons:

1. Presumably you are here to learn how to best design, implement, and manage corporate IT systems. The best way to do that is to struggle with these issues yourself and with your teammates and classmates. Anything less and you are wasting your time and money as a student and short-changing your long-term growth as an IT professional. Making (and learning from) mistakes today is a very low-cost way to improve your skills. Once you hit the corporate world, the mistakes become very costly.

2. Case analysis is not like algebra where there is a particular answer that the grader is looking for. These cases are typically written with multiple possible recommendations. Don't assume that just because someone in some business school says you should do X, that X is the "correct" way (or even a good way) to approach a particular case.

3. You run the risk that others in the class will come across the same materials, make the same recommendation as you (possibly using very similar words) — which raises huge red flags regarding plagiarism.

4. It damages our classroom discussion. If everyone gives the same recommendation, we don't have the opportunity to fully explore other options — and exploring and learning from other options is part of the joy and excitement of case work.

5. It makes you subservient to the recommendations of others — who may or may not know anything about the underlying technology, IT project management, etc. One of the premises of the MISM/MSIT program is that people with a strong IT background will be able to do a better job managing IT projects than others who don't have a tech background. I'm assuming that's why you are here and not somewhere else.

So, for the sake of your professional development, our classroom discussion, your academic integrity, and your pride in your degree program, using someone else's case "solutions" is a bad idea. However, if you insist on using these resources, you must cite your sources in the body of your report and on your slides, whether you use direct quotes from them or not. You are, of course, perfectly free (and encouraged) to research any of the companies or issues that we discuss in class. I am just asking that you not use outside discussions of the cases themselves.

### Use of Generative AI (ChatGPT)

I expect you will use AI (e.g., ChatGPT and image generation tools) in this class. In fact,

some assignments require it. Learning to use AI is an emerging skill and to get started, I have provided three tutorials below:

- How to use ChatGPT to boost your writing
- The practical guide to using AI to do stuff
- APA citation guidelines for GAI (ChatGPT example)

You should also be aware of the limits of ChatGPT:

- **If you provide minimum-effort prompts, you will get low-quality results.** You will need to refine your prompts in order to get good outcomes. This will take work.

- **Don't trust everything it says.** If it gives you a number or fact, assume it's wrong unless you either know the answer or can check with another source. You will be responsible for any errors or omissions provided by the tool. It works best for topics you understand.

- **AI is a tool, but one that you need to acknowledge using**. Please include a paragraph at the end of any assignment that uses AI explaining what you used the AI for and what prompts you used to get the results. Failure to do so can constitute as an academic integrity violation.

- **Be thoughtful about when this tool is useful.** Don't use it if it isn't appropriate for the case or circumstance.

Resources we may use to validate work against generative AI (and that you can use) include:

https://aiwritingcheck.org/
https://www.turnitin.com/ (built into Canvas)
https://github.com/jwkirchenbauer/lm-watermarking
https://gptzero.me/

Some CMU strategies being employed include:
https://www.cmu.edu/teaching/technology/aitools/index.html

You may use generative AI for the following work:
- Group & individual assignments

You may NOT use generative AI for the following work:
- Surveys & the final exam

I am happy to meet and help you with these tools during office hours or after class.


**Course Web Site: http://canvas.cmu.edu**

We will use Canvas for course information and announcements. If you are registered in the class, you should already have access. Your login id is your andrew id & password.

If you're on the wait list, you won't be able to access the site. Contact us for content.

The web site has an up-to-date copy of the syllabus, schedule, pertinent documentation, A/V, and any class announcements. While I will try to make announcements both in class and on the web site, it is a good idea for you to check the web site regularly. Additionally, the web site has links to class readings and relevant sites mentioned in class and more extensive background material.

**Grading and Course Requirements:**

You will be evaluated on the basis of your case analyses & presentations, class participation, and an individual final assessment handed out at the end of the mini. Your team-based presentations will be graded as group work with a peer evaluation tool. All other grades are individual based. Canvas should only be used to track individual grades, not cumulative. The grading system on Canvas does not accurately track the grading scheme used in this class. Please follow up with the TA and/or myself for grading questions. The breakdown for your work is as follows:

| Student Tasks: | Total # of Tasks | Earning Potential | Overall % |
|---|---|---|---|
| Profile & Surveys | 5 | 60 | 6% |
| Assignments | 6 | 610 | 61% |
| Class Contribution (includes ind. team based evaluations, peer evaluations & class participation) | 10 + all classes | 120 | 12% |
| Final Assessment | 1 | 210 | 21% |
| TOTAL | | 1000 | 100% |

potential equates to the max you can earn for the total number of that specific task (EP/TT=Single Value).

Class (synchronous) and Canvas (asynchronous) Discussion Participation: The quality of our learning environment is contingent on effective and informed participation of each class member. The goal here is not to dazzle us with your individual brilliance or with the number of comments you make, but rather to help make the class smarter. Note that, in addition to providing new insights to the discussion, it is possible to make the class smarter by asking the right question or by assimilating comments from other students or sources.

The Canvas analyses are designed to help you participate in an effective manner outside of class. The quality of your comments and your ability to build on and respond to threads in a conversation about all issues will be considered in assigning your participation grade.

It is important to note that canvas contribution is assessed on an individual basis.

*Grading Rubric* (25% per criteria below):

a.   Preparation, original thought/contribution (reflects a perspective building from discussions in class), contributed to original scenario/question.
b.   Ability to coherently present arguments and to contribute to a discussion (vs. creating new threads), development of thought (Full explanation, details, insights).
c.   Ability to influence and persuade others in class to agree with your opinion, or to provide a thoughtful critique to another thought (beyond general agreements) with elaboration.
d.   Is error free, contains references, and meets or exceeds required length.

Class Contribution: is inherently a subjective assessment but will take the following factors into account: 1. Showing up to all classes for the week, paying attention with distractions removed (phone, computer, Tamagotchi, etc.) 2. Contributing to the learning in the classes via synch and asych mechanisms.

Case Analysis: You case analysis grade is based on a 2-page write-up (1 to 1.5-spacing, 12-point Time New Roman font, 1-inch margins) + up to 3 exhibit pages. You case submission is **due to Canvas by midnight the day before the case is discussed in class**.

I will also assign groups to present their recommendations to class. Your write-up and presentation should address issues raised in the case narrative & associated discussion questions. You are encouraged to go beyond the set of questions that I give you to seed the discussion and to use additional resources to research the background of the firms as you see fit. Case analysis documents are group work and should adopt the following perspective:

a.   What are the business/strategic drivers of process digitization in the particular environment being analyzed?

b.   What is the role of IT architecture in either enabling or inhibiting process digitization?

c.   Given your knowledge of technologies to date, do you agree with the choice of technologies and the manner in which the technologies were deployed in process digitization?

d.   Did the case describe the organizational challenges encountered in process digitization? Do you agree with the manner in which the organizational challenges were dealt with? If the case did not describe organizational challenges, what do anticipate them to be and what are your recommendations for overcoming them?

The format for the case write-up is contained in a handout that will be provided in class. For presentations, you should target 20 minutes of prepared comments, but with enough backup slides/information to answer any questions that might arise about your recommendations.

*Grading Rubric:*

**Analysis (60%)** - understanding of the case and the issues highlighted, and solid reasoning for your argument/recommendation based on the research questions presented.

| LEVEL OF PROFICIENCY | Exemplary (9.8-10) | Accomplished (8-9.7) | Developing (5-7.9) | Needs work (0-4.9) |
|---|---|---|---|---|
| **Problem Scoping** | Clearly defines the problem, its boundaries and the project's scope. | Defines the problem, with an understanding of its boundaries and the project's scope. | Sometimes makes contributions to defining the project's scope, but ideas are vague. | Does not make contributions to define the project's scope. |
| **Problem Solving** | Reviews multiple approaches for solving the problem that identifies a grounded approach within the specific context. | Identifies multiple approaches for solving the problem, only some of which apply within a specific context. | Identifies only a single approach without other considerations for solving the problem but that applies within the specific context. | Identifies one or more approaches to solving the problem but that do not apply within the specific context. |
| **Technology and Managerial Implementation (strength, testing, evaluation, quality)** | Clear knowledge and know-how to research and implement appropriate technologies for the project. This could include areas out of scope that add value and were approved.<br><br>Business and technological decisions are synergistic. | Some knowledge and understanding of the technology to incorporate within the project are displayed. Technical needs are mostly met to provide adequate project delivery and a solution to the problem area identified by the case problem.<br><br>Business and/or technical decisions may show some minor lack of cohesiveness. | Vague incorporations or directions of technical research and implementations. Technical needs are still in development but show signs of creating a solution to the client problem but may not be met within the project.<br><br>Business and/or technical decisions may show major lack of cohesiveness. | No knowledge or understanding of the technology to be incorporated within the project, technical needs are not met, or do not work.<br><br>No cohesiveness between business and technical constraints. |
| **Generates valid conclusions/decisions and considers the audience** | Recommended solution is based on stated criteria, analysis and constraints and considers other options. Case expectations are fully met or exceeded. Considers not only current but future scope. | Solution/decision is reasonable; further analysis of some of the alternatives or constraints defer different recommendations. Case expectations are mostly met. | Solution/decision is reasonable; further analysis of some of the alternatives or constraints may have led to different recommendations. Case expectations are somewhat met. | Only one solution is considered, or other solutions were ignored or incompletely analyzed. Many constraints and criteria were ignored. Case analysis shows poor project outcomes. |

**Content (30%)** - based on the use of assigned readings, other resources, & supporting examples.

| LEVEL OF PROFICIENCY | Exemplary (9.8-10) | Accomplished (8-9.7) | Developing (5-7.9) | Needs work (0-4.9) |
|---|---|---|---|---|
| **Identifies relevant & valid sources of information to support decision-making** | All relevant information is obtained, and information sources are valid and accurate.<br><br>Solutions are well | Sufficient information is obtained, and most sources are valid.<br><br>Solutions are mostly supported by the information gathered that create a connection between research and concept. | Some relevant information is obtained but information sources are not always valid and accurate.<br><br>Solutions are not well supported by the information gathered and doesn't show a connection | Insufficient information is obtained and/or sources lack validity and reliability.<br><br>Solutions have no support by the evidence and nothing to show that the information gathered |

| | | | |
|---|---|---|---|
| **through research** | supported by a deep and logical connection between research and conceptualizations.

Alternatives exploring different facets of use are considered and are appropriately analyzed for feasibility.

Identifies appropriate data for analysis and exceeds findings in an optimal methodology to address the problem.

Sketches, prototypes, graphs and/or scenarios are used to bring opportunity areas to life. | Alternatives are considered but are not fully vetted.

Identifies appropriate data for analysis and a methodology for addressing the problem.

Sketches, prototypes, graphs and/or scenarios are sometimes used or may be slightly inconsistent. | between research and concept.

Alternatives exploring different facets of use are rarely considered or are not appropriately analyzed for feasibility

Attempts to identify data for analysis but may not understand or have an optimal methodology to solve the problem.

Sketches, prototypes, graphs and/or scenarios are used but need a lot of explanation to bring opportunity areas to life or struggle to make the connection. | creates a connection between the research and concept.

Alternatives are not considered or are not valid.

Does not identify appropriate data for analysis.

Sketches, prototypes, graphs and/or scenarios are not used and/or do not bring opportunity areas to life or only cause confusion. |

**Presentation (10%)** - clear structure and organization of the case write-up/presentation, following the format requirements, and staying within the page/time limit. Addresses all Q&A clearly with grounded information (real-time and on Canvas).

| LEVEL OF PROFICIENCY | Exemplary (9.8-10) | Accomplished (8-9.7) | Developing (5-7.9) | Needs work (0-4.9) |
|---|---|---|---|---|
| **Client Skills** | Class interactions are professional and productive, eliminates jargon and explains ideas well.

Demonstrates a high level of comfort and connection with the audience. Speakers respond accurately and appropriately to audience questions and comments. | Class interactions are mostly professional and productive. Few miscommunications and disconnects with some jargon that may interfere with explanation of ideas. Demonstrates a decent level of comfort with the audience. Speakers respond to most questions accurately and appropriately but may be slow | Class interactions are somewhat professional and productive. More miscommunications and disconnects with some jargon that may interfere with explanation of ideas.

Demonstrates a slight discomfort with the audience. Speakers respond to questions less accurately and appropriately, and/or respond slowly. | Class interactions are unprofessional and/or unproductive. Multiple miscommunications and disconnects, and full for jargon and misunderstandings of ideas.

High degree of discomfort interacting with the audience. Speakers have difficulty responding clearly and accurately to audience questions or never responds. |
| **Presentation Skills (visual, oral, written documentation) for telling the story** | Slides are error-free and logically present the main components of the process and recommendations.

Material is completely legible, and the graphics | Slides are mostly error-free and logically present the main components of the process and recommendations.

Material is completely readable with some slight | Slides are not completely error-free and/or logically presenting the main components of the process and recommendations.

Material is readable with some challenges, and | Slides contain errors and lack a logical progression. Major aspects of the analysis or recommendations are absent. Diagrams or graphics are absent or confuse the audience. |

| | | | |
|---|---|---|---|
| highlight and support all of the main ideas. Sentences are grammatical with no spelling errors present.<br><br>Speakers are audible and fluent on their topic, and do not rely on notes to present or respond.<br><br>Is an effective summary of the team's efforts and works visually and considers all audiences.<br><br>Does not run over allotted time but stays within the ideal range (Within 1-2 minutes) or allotted page length.<br><br>Report is well organized and clearly written. The underlying logic is clearly articulated and easy to follow. Diagrams or analyses enhance and clarify presentation of ideas. Sentences are grammatical and free from spelling errors. | effort, and graphics reiterate most the main ideas. Sentences are grammatical with minimal spelling errors present that do not hinder the reader.<br><br>Speakers are mostly audible and fluent on their topic and require minimal referral to notes.<br><br>Is an effective summary of the team's efforts and is visually appealing and understandable for the audience.<br><br>May slightly run over time or ends prematurely (2-4 minutes) or is over/under page length.<br><br>Report is organized and clearly written. In all areas the logic or flow of ideas is clear to follow. Diagrams are consistent with the text. | graphics somewhat reiterate the main ideas. Sentences are seeing grammatical errors with more spelling errors present that start to hinder the reader.<br><br>Speakers are somewhat audible and fluent on their topic and require continual referral to notes or read directly from slides.<br><br>Is a slightly less effective summary of the team's efforts and is less visually appealing and understandable for the audience.<br><br>May run over time (over 2 minutes) or ends prematurely (4-5 minutes), or grossly over or under page length.<br><br>Report is organized and clearly written for the most part. In some areas the logic or flow of ideas is difficult to follow. Diagrams are somewhat consistent with the text. | Sentences are seeing many grammatical errors with many spelling errors present that completely hinder the reader.<br><br>Speakers are often inaudible or hesitant, often speaking in incomplete sentences. Speakers rely heavily on notes.<br><br>Is not an effective summary and does not work visually.<br><br>The full audience is not considered.<br><br>Time is well under or over allotted time (5+ minutes) or is extremely over or under page length.<br><br>Report lacks an overall organization. Reader has to make considerable effort to understand the underlying logic and flow of ideas. Diagrams are absent or inconsistent with the text. |

Final Assessment: There will be a take home final assessment assigned during finals week and due by the end of that week. The assessment will ask you to integrate information we have learned across the lectures, cases and readings we've covered during the semester.

Peer Review: Since the case analyses are group work, I will use a peer review instrument to ensure that feedback from group members about team member contributions are considered in the determination of the final grade. 50% of the peer evaluation is dependent on your timely and well-documented submission, with the other 50% dependent on the scoring from your peers.


**A Note on Regrade Requests:**

We make every effort to return graded assignments within 1 week of their submission. If you believe that your grade is inaccurate, you may request a regrade under the following conditions:

1. Regrade requests must be submitted within 1 week of the grade posting date.

2.  Regrade requests must be in writing and must include a copy of the original assignment.

3.  Regrade requests must outline the reasons you deserve a higher grade. These will typically be that the grader misread or misunderstood your answer, or didn't take something into account that they should have. For this, you should use the written comments on the assignment as your reference point. Referencing another student's grade is inappropriate and irrelevant. While we do our best to apply an even standard across students, we can't discuss anyone else's grade with you, so we need to deal with the merits of your particular case.

4.  I reserve the right to regrade the entire assignment and thus your grade may go up, down, or stay the same. This regrade is considered final.

5.  Class participation grades are inherently subjective and are not subject to a regrade request. I will make notes on participation at the end of each class and assign grades at the end of the semester based on these notes.

6.  At the conclusion of class (at the end of the last assignment), no regrade requests, retakes, redo's, or extra credit assignments that can be done. Please be sure to contact the TA and/or the instructor during the semester for grade concerns and ways to improve.

**Late Submission Policy:**

All late assignments are subject to a grade penalty of 10% per day past the due date/time, with a maximum of 4 days. Anything submitted beyond 4 days past the due date receives an automatic 0. Teams and individual submissions are subject to the same policy. Any issue with meeting a deadline must be cleared through the instructor and/or TA prior to the submission date/time or will be subject to the penalty.

**Student Health and Wellness:**

CMU and all classes, including this one, strive to accommodate students in all capacities by creating a learning environment that considers the health and well-being of all students. A review the university policies regarding health and wellness can be reviewed at:

https://www.cmu.edu/graduate/current-grad-students/health-and-wellness/index.html

Review graduate student policies at: https://www.cmu.edu/graduate/policies/index.html

Support hotline for students. Lean On Me is an online community support hotline where CMU students can text in and talk anonymously to trained supporters, who are also CMU students: (412) 530-4700 or send a message on Instagram @leanonme.cmu!

**Covid-19 Policies**

**Facial Coverings:** Facial coverings both indoors and outdoors are optional.
**Vaccinations:** All students, faculty & staff are no longer required to be up to date on vaccinations.

**As of May 12 2023, CMU has decommissioned Tartan Testing operations and the lab**. Testing is no longer required. COVID-19 tests will be available in the vending machine located in the Cohon University Center until supplies are depleted.
**CMU no longer requires reporting COVID-19 cases**. Community members who contract COVID-19 should follow the guidance of their care provider regarding isolation, as they would with any communicable disease.

## Diversity and Inclusion

It is my intent that students from all diverse backgrounds & perspectives be well served by this course, that students' learning needs be addressed both in & out of class, & that diversity that students bring to this class be viewed as a resource, strength & benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race & culture. Your suggestions are encouraged & appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so we can make arrangements for you.

The topics that we're covering in this class can be difficult, not just intellectually but emotionally. While I expect there to be rigorous discussion and even disagreement during our class discussions, I ask that you engage in discussion with care and empathy for the other members in the classroom. Aim to disagree without becoming disagreeable. In this class we will not shy away from the uncomfortable. Critically examining and assessing our most basic assumptions and values is not just one of the tasks of philosophy but is an activity vital to living an authentic life. I urge you to have the courage to the uncomfortable in this class. In exchange for your courage, I will work to ensure a classroom environment that supports your taking these intellectual and emotional risks.