

**MANAGEMENT OF INNOVATION, SUSTAINABILITY, AND TECHNOLOGY
MANAGEMENT OF COMPLEX SYSTEMS Ph.D. AND M.S. DEGREE REQUIREMENTS**

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A. Introduction

- 1) **Aims and Scope:** The Doctor of Philosophy (Ph.D.) and Master of Science (M.S.) degree programs offered by the Graduate Group in Management of Innovation, Sustainability, and Technology (MIST) at the University of California, Merced, are distinctive educational experiences that flexibly integrate graduate course offerings from MIST and other programs on campus, combining faculty and graduate students with diverse disciplinary backgrounds to create unique interdisciplinary research and education opportunities at the intersection of management, innovation, sustainability, and technology. The programs provide training in qualitative and quantitative management skills tailored for the 'wicked problems' often encountered in complex adaptive systems, addressing the need for developing deep knowledge and leadership in areas of management relevant to the region, the state, and the world.
- 2) **Admissions Requirements:** Applicants admitted into the graduate programs in MIST will be expected to have completed a bachelor's degree at a four-year accredited college or university and to have attained an undergraduate academic record that satisfies the standards established by the Graduate Division, University of California, Merced. In addition to the following requirements, all applicants must meet the general requirements as set forth in the Graduate Studies section of the General Catalog.

Any applicant who spent the majority of their primary and secondary education in a nation/territory where English is not the primary language must take an approved English proficiency examination prior to admission. Proficiency in English may be demonstrated by passing standardized, internationally administered tests as stated in the UC Merced Graduate Policy and Procedures Handbook located on the Graduate Division website.

The regular schedule for applications will be for admission in Fall semester, but faculty may accept students off-cycle for admission in Spring semester with the approval of the MIST GG Chair.

- a) **Prerequisites:** There are no prerequisites.
 - b) **Deficiencies:** No prior coursework deficiencies may be made up.
- 3) **General Committees:** According to the MIST Graduate Group Bylaws, there is one standing faculty committee:
 - a) **Executive Committee:** The Executive Committee (EC), in consultation with the faculty, determines and implements policy for the good of the Group, establishes and guides the educational requirements of the Group, and represents the interests of the Group to the University and other agencies. The EC consists of the Graduate Group Chair and at least two elected members from the MIST faculty. The Executive Committee will make appointments to ad hoc committees of the Group.

The Executive Committee's duties include:

- i. Hear student grievances, make determinations of fact, and rule on grievance cases. Final resolution lies with the Dean of the Graduate Division as described in UC Merced's Graduate Advisors Handbook.
- ii. Establish and maintain documentation on MIST Group curricula.
- iii. Prepare and execute all reviews of MIST Group programs.
- iv. In consultation with Group faculty, coordinate and document proposed changes in programmatic requirements. All changes to programmatic requirements of MIST curricula and associated requirements must be approved by vote of the eligible faculty.
- v. Review applications for admissions in consultation with Group faculty. The Committee will make recommendations for admissions to the Dean of Graduate Studies, explore graduate student support mechanisms, and allocate intramural financial assistance.
- vi. Recommend the allocation of intramural financial assistance, fellowships, and awards for new and continuing students.
- vii. Create and staff additional committees as needed. EC duties may be delegated.

B. Master's Degree Requirements

Students pursuing an M.S. degree must complete M.S. course requirements, fulfill the university residency requirement, and either give a public oral presentation and successfully defend a master's thesis containing original research (Plan I) or pass a comprehensive exam (Plan II). M.S. students will, in consultation with their faculty advisor, select either the exam or thesis option in Fall semester of the first year and then constitute either a thesis committee or an exam committee, as appropriate. Students should refer to Section VI.A: Master's Degree Requirements of the UC Merced Graduate Policies and Procedures Handbook for additional details on program requirements.

1) Degree Plan I – Thesis

Degree Plan I – Thesis requires a minimum of 24 semester units in approved courses, at least 20 of which must be from graduate-level courses in the 200 series and taken for a letter grade. A written thesis and oral examination are also required.

- a) **Program Learning Outcomes (PLOs):** The goal is for the students to master MIST's cross-disciplinary management concepts and their application in a range of real-world problems, providing a solid basis for future academic and industry positions. There are five PLOs:
 - *Foundations.* Students will apply disciplinary concepts and theories for framing and defining research questions and plans from business, management, economics, sociology, psychology, cognitive science, environmental science and engineering.

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- *Methods.* Students will be able to apply contemporary social science and scientific methods needed to conduct rigorous research in their area of specialization.
- *Communication.* Students will communicate effectively to experts and non-experts, in professional (scientific and management) and community settings, preparing and delivering oral and written presentations using appropriate technologies.
- *Research Practice and Independence.* Students will be able to initiate and conduct independent research (e.g. review of literature, development of a research question and methodology, analysis, discussion, and conclusion) that makes an original contribution to knowledge, and which may be published in a peer reviewed outlet.
- *Research ethics and societal context.* Students will demonstrate familiarity with all aspects of research ethics and the societal context of their work.

b) Course Requirements - Core and Electives (total 24 units): M.S. students must

- Complete at least two semesters of academic residence at UC Merced
 - Complete a minimum of 24 units of courses at the upper division and graduate levels, with at least 20 units of graded graduate (200-level) courses, including Foundations I (MIST 252) and at least two courses in research methods (with letter grade B or better).
 - Enroll in the Management of Complex Systems seminar (MIST 251) once for credit (S/U)
 - Give a public oral presentation and successfully defend a master's thesis containing original research.
- Core Courses (total 5 units):** All M.S. students must take Foundations I and the Graduate Seminar once for credit.

| Course No. | Title | Units |
|------------|------------------|-------|
| MIST 251 | Graduate Seminar | 1 |
| MIST 252 | Foundations I | 4 |

- Elective Courses (total 19 units):** All M.S. students must take five elective courses, at least four of which are graduate level courses, including at least two graduate level courses which must be in research methods. A current list of elective courses is maintained by the Graduate Group chair and available on the MCS webpage and provided below. Courses marked by an asterisk (*) qualify as research methods courses given their focus on quantitative or qualitative analysis and methodologies. Additional courses can qualify but require the approval of a student's faculty advisor and the MIST GG Chair.

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| Course No. | Title | Units |
|-------------------|---|--------------|
| MIST 201 | Leadership, Organizations, and Communications | 4 |
| MIST 202 | Managerial Finance and Accounting | 4 |
| MIST 203 | Quantitative Tools for Management | 4* |
| MIST 204 | Spatial Analytics | 4* |
| MIST 205 | Technology-Enabled Service | 4 |
| MIST 206 | Entrepreneurship and Innovation | 4 |
| MIST 207 | Project and Operations Management | 4 |
| MIST 208 | Law, Policy, and Risk Management | 4 |
| MIST 215 | Political Ecology and Complexity | 4 |
| MIST 218 | Social Reality | 4 |
| MIST 231 | Organizational Behavior | 4 |
| MIST 241 | Management Information Systems | 4 |
| MIST 253 | Foundations II | 4 |
| MIST 254 | Systems Thinking | 4 |
| MIST 260 | Research Methods | 4* |
| MIST 261 | Qualitative Methods | 4* |
| MIST 264 | Energy Policy | 4 |
| MIST 270 | Data Science | 4* |
| MIST 271 | Network Science | 4* |
| MIST 295 | Graduate Student Research | 1-5 |
| COGS 204 | Complex Adaptative Systems | 4 |
| EECS 255 | Advanced Human-computer Interaction | 4* |
| ES 222 | Organic Matter | 3 |
| ES 232 | Applied Climatology | 3* |

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| | | |
|-----------------|--|----|
| IH 203 | Pedagogy in Interdisciplinary Humanities | 4 |
| POLI 215 | Intro to Game Theory | 4* |
| PSY 202A | Advanced Psychological Statistics | 4 |
| SOC 205 | Graduate Writing & Publishing | 4 |
| SOC 210 | Graduate Statistics I: Linear Regression | 4* |
| SOC 215 | Graduate Research Methods | 4* |

- iii. **Summary:** M.S. students must complete a minimum of 24 units of courses at the upper division and graduate levels, with at least 20 units of graded graduate (200-level) courses, including Foundations I (MIST 252) and at least two research methods courses (with letter grade B or better), and they must enroll in the Management of Complex Systems seminar (MIST 251) once for credit (S/U).
- c) **Special Requirements:** M.S. students in Plan I – Thesis must give a public oral presentation and successfully defend a master's thesis containing original research.
- d) **Advancement to Candidacy:** Before advancing to candidacy for the Master's degree, a student must have maintained a minimum GPA of 3.0 in all course work. Normally, students advance after one semester.

In the case of the Master's degree, the terms and deadlines for formal advancement to candidacy are outlined in the Graduate Division dates and deadlines website (<https://graduatedivision.ucmerced.edu/current-students/calendar-and-deadlines>). An Application for Advancement to Candidacy initiated by the student and approved by the Graduate Group should be submitted to the Graduate Dean before the specified deadline. The application must be accompanied by petitions for any course credits that have not already been approved by the Graduate Dean. Committee membership for master's degree must be included on the advancement to candidacy form. For thesis track (Plan I), the graduate student, graduate advisor, and the Graduate Group chair must complete the Conflict of Interest Statement on the form. Students must be advanced to candidacy prior to degree conferral.

- e) **Thesis Requirements:** The thesis committee will typically be constituted in the Fall of the first year, and will consist of at least three faculty members, one of whom would ordinarily be the faculty advisor and committee chair. A majority of the committee must be members of the MIST Graduate Group. One member may (but is not required to) be a non-MIST UC or equivalently credentialed faculty member, as appropriate. M.S. students pursuing the thesis option will work

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closely with the thesis committee on a research project that integrates the graduate curriculum. The composition of thesis committee must be approved by the MIST GG Chair.

Thesis committee meetings: Once the committee is formed, the candidate and advisor should meet at least once a semester with the other members of the thesis committee to discuss progress and any changes in research objectives.

Thesis: Research for the Master's thesis is to be carried out under the supervision of a faculty member of the program and must represent an original contribution to knowledge in the field. The thesis research must be conducted while the student is enrolled in the program. The thesis is submitted to the thesis committee at least one month before the scheduled defense. All committee members must approve the thesis in its entirety and sign the title page before the thesis is submitted electronically to the Graduate Division for final approval. Should the committee determine that the thesis is unacceptable, even with substantial revisions, the program may recommend the student for disqualification from the program.

The thesis must be submitted by the deadlines outlined in the Graduate Division website, in the semester in which the degree is to be conferred.

2) Degree Plan II - Non-thesis

Degree Plan II – Non-thesis requires a minimum of 24 semester units in approved courses, at least 20 of which must be from graduate-level courses in the 200 series and taken for a letter grade. A comprehensive final examination in the major subject is required. No thesis is required.

- a) **Program Learning Outcomes (PLOs):** The goal is for the students to master MIST's cross-disciplinary management concepts and their application in a range of real-world problems, providing a solid basis for future academic and industry positions. There are five PLOs:

- *Foundations.* Students will apply disciplinary concepts and theories for framing and defining research questions and plans from business, management, economics, sociology, psychology, cognitive science, environmental science and engineering.
- *Methods.* Students will be able to apply contemporary social science and scientific methods needed to conduct rigorous research in their area of specialization.
- *Communication.* Students will communicate effectively to experts and non-experts, in professional (scientific and management) and community settings, preparing and delivering oral and written presentations using appropriate technologies.
- *Research Practice and Independence.* Students will be able to initiate and conduct supervised research (e.g. review of literature, development of a research question and methodology, analysis, discussion, and conclusion).

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- *Research ethics and societal context.* Students will demonstrate familiarity with all aspects of research ethics and the societal context of their work.

b) Course Requirements - Core and Electives (total 24 units): M.S. students must

- 1) Complete at least two semesters of academic residence at UC Merced.
 - 2) Complete a minimum of 24 units of courses at the upper division and graduate levels, with at least 20 units of graded graduate (200-level) courses in the major subject, including Fundamentals I (MIST 252) and at least two in research methods (with letter grade B or better).
 - 3) Enroll in the Management of Complex Systems seminar (MIST 251) once for credit (S/U)
 - 4) Pass a comprehensive exam.
- i. **Core Courses (total 5 units):** All M.S. students must take Foundations I and the Graduate Seminar once for credit.

| Course No. | Title | Units |
|------------|------------------|-------|
| MIST 251 | Graduate Seminar | 1 |
| MIST 252 | Foundations I | 4 |

- iii. **Elective Courses (total 19 units):** All M.S. students must take five elective courses, at least four of which are graduate level courses, including at least two graduate level courses which must be in research methods. A current list of elective courses is maintained by the Graduate Group chair and available on the MCS webpage and provided below. Courses marked by an asterisk (*) qualify as research methods courses given their focus on quantitative or qualitative analysis and methodologies. Additional courses can qualify but require the approval of a student's faculty advisor and the MIST GG Chair.

| Course No. | Title | Units |
|------------|---|-------|
| MIST 201 | Leadership, Organizations, and Communications | 4 |
| MIST 202 | Managerial Finance and Accounting | 4 |
| MIST 203 | Quantitative Tools for Management | 4* |
| MIST 204 | Spatial Analytics | 4* |
| MIST 205 | Technology-Enabled Service | 4 |

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| | | |
|-----------------|--|-----|
| MIST 206 | Entrepreneurship and Innovation | 4 |
| MIST 207 | Project and Operations Management | 4 |
| MIST 208 | Law, Policy, and Risk Management | 4 |
| MIST 215 | Political Ecology and Complexity | 4 |
| MIST 218 | Social Reality | 4 |
| MIST 231 | Organizational Behavior | 4 |
| MIST 241 | Management Information Systems | 4 |
| MIST 253 | Foundations II | 4 |
| MIST 254 | Systems Thinking | 4 |
| MIST 260 | Research Methods | 4* |
| MIST 261 | Qualitative Methods | 4* |
| MIST 264 | Energy Policy | 4 |
| MIST 270 | Data Science | 4* |
| MIST 271 | Network Science | 4* |
| MIST 295 | Graduate Student Research | 1-5 |
| COGS 204 | Complex Adaptative Systems | 4 |
| EECS 255 | Advanced Human-computer Interaction | 4* |
| ES 222 | Organic Matter | 3 |
| ES 232 | Applied Climatology | 3* |
| IH 203 | Pedagogy in Interdisciplinary Humanities | 4 |
| POLI 215 | Intro to Game Theory | 4* |
| PSY 202A | Advanced Psychological Statistics | 4 |
| SOC 205 | Graduate Writing & Publishing | 4 |
| SOC 210 | Graduate Statistics I: Linear Regression | 4* |
| SOC 215 | Graduate Research Methods | 4* |

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- iii. **Summary:** M.S. students must complete a minimum of 24 units of courses at the upper division and graduate levels, with at least 20 units of graded graduate (200-level) courses in the major subject, including Foundations I (MIST 252) and at least two courses in research methods. (with letter grade B or better), and they must enroll in the Management of Complex Systems seminar (MIST 251) once for credit (S/U)
- c) **Special Requirements:** M.S. students in degree Plan II – Non-thesis must pass a comprehensive exam.
- d) **Advancement to Candidacy:** Before advancing to candidacy for the Master's degree, a student must have maintained a minimum GPA of 3.0 in all course work undertaken during the first semester. Normally, students advance after one semester.

In the case of the Master's degree, the terms and deadlines for formal advancement to candidacy are outlined in the Graduate Division dates and deadlines website (<https://graduatedivision.ucmerced.edu/current-students/calendar-and-deadlines>). An Application for Advancement to Candidacy initiated by the student and approved by the Graduate Group should be submitted to the Graduate Dean before the specified deadline. The application must be accompanied by petitions for any course credits that have not already been approved by the Graduate Dean. Committee membership for master's degree must be included on the advancement to candidacy form. Students must be advanced to candidacy prior to degree conferral.

- e) **Comprehensive Examination:** The comprehensive exam may be given as an oral or written exam based on questions developed and graded by the Comprehensive Examination Committee. The committee will typically be constituted in the Fall of the first year, and will consist of at least three MIST faculty members, one of whom would ordinarily be the faculty advisor and committee chair. The composition of committee must be approved by the MIST GG Chair. To create the exam questions, the committee will solicit questions from the instructors of courses the student has taken and meet with the student during the spring semester to set expectations regarding the material to be covered by the exam. The results of the examination will be reported to Graduate Division using the "Final Report for the Master's Degree Form."
- i) **Timing:** Students may take the comprehensive examination once they have advanced to candidacy. Typically, students will take the exam near the end of the coursework for the Master's degree (at the end of the first year).
- ii) **Outcome:** Examinations can result in either a pass, fail, or partial pass by the examination committee.
 - a. A student has passed when the Comprehensive Examination Committee unanimously votes that the student passed the entire

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examination with scholarship that is at least acceptable. If agreed unanimously by the committee the student may be allowed to make minor modifications prior to submitting the results of the examination.

- b. A student has failed when the Comprehensive Examination Committee votes unanimously that the student failed the entire examination. The second examination may have a format different from the first, but the substance should remain the same. A student whose performance on the second attempt is also unsatisfactory, or who does not undertake a second examination within a reasonable period of time, is subject to academic disqualification. A third examination may be given only with the approval of the Graduate Group committee and the Vice Provost and Dean of Graduate Education.
 - c. A student has partially passed when the Comprehensive Examination Committee votes that the student passed some components but failed others. This may also involve non-unanimous decisions (or split-decisions) from the committee. In this instance, the following apply:
 - i. The student has the option of taking the examination one more time as detailed in above on the components failed; and
 - ii. The chair of the committee must write a letter to the student, with a copy to the Graduate Division, conveying the information about the student's performance (pass, fail, or partial pass) on each of the components covered during the examination.
- 3) **Advising Structure and Mentoring:** The graduate advisor is the faculty member who supervises the student's research and thesis. The Graduate Advisor, who is appointed by the MIST Graduate Group Chair, is a resource for information on academic requirements, policies and procedures, and registration information. The Graduate Group Staff assists students with identifying appointments and general university policies. Mentoring guidelines can be found on the Graduate Division website: [UCM Mentoring Guidelines](#).
- 4) **Master's Degree Committees**
- a) **Thesis Committee:** The thesis committee will typically be constituted in the Fall of the first year, and will consist of at least three faculty members, one of whom would ordinarily be the faculty advisor and committee chair. A majority of the committee must be members of the MIST Graduate Group. One member may (but is not required to) be a non-MIST UC or equivalently credentialed faculty member, as appropriate. M.S. students pursuing the thesis option will work closely with the thesis committee on a research project that integrates the graduate curriculum. The student, in consultation with the graduate advisor and graduate group chair, nominate three faculty to serve on the Thesis Committee. The composition of thesis committee must be approved by the MIST GG Chair and the Graduate Dean.

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- b) **Comprehensive Examination Committee:** The committee will typically be constituted in the Fall of the first year, and will consist of at least three MIST faculty members, one of whom would ordinarily be the faculty advisor and committee chair. The student, in consultation with the graduate advisor and graduate group chair, nominate three faculty members to serve on the Comprehensive Examination Committee. The committee shall approve the subject, pass on the content of examination, and administer the examination. The composition of committee must be approved by the MIST GG Chair and the Graduate Dean.
- 5) **Concentrations:** Students may optionally declare a concentration in either *Decision Science and Analytics* or *Program Management* as part of their Master's Degree. Concentrations are areas of significant student interest and require students to take three courses from an approved list maintained by the Graduate Group chair and available on the MCS webpage and provided below. These courses can satisfy both concentration and the MS program elective and methods courses. Substitutions for courses that count toward the concentrations will be considered by petition to Graduate Group Chair.
 - i. *Decision Science and Analytics.* MIST 203, 204, 260, 261, 270, 271; ES 232; or courses approved by petition to Graduate Group Chair.
 - ii. *Program Management.* Three courses from MIST 201, 202, 205, 206, 207, 208, 211, 215, 218, 231, 241, 254, 264; or courses approved by petition to Graduate Group Chair.
- 6) **Normative Time to Degree:** Normative time to degree for the M.S. is one year.
- 7) **Typical Timeline and Sequence of Events:**

Year 1

Fall: MIST 252 (4), Methods I (4), Elective I (4),

Spring: MIST 251 (1), Elective II (4), Methods II (4), Elective III (3), thesis or exam

- 8) **Sources of Funding:** Graduate students who received a funding offer with their admissions offer will have their financial support according to the terms of the funding offer. Funding will come through a combination of Teaching Assistantships, Graduate Research Assistantships, and/or Fellowships. Master's students are typically not expected to be funded by such means; but they may receive a funding offer with their admissions offer. More information on financial support can be found in the Graduate Policies and Procedures Handbook.

C. Doctoral Degree Requirements

The Ph.D. program emphasizes collaborative and interdisciplinary research training. Typically, graduate students work closely with one or more faculty in pursuing scientific research, while taking a series of courses that can be tailored to the specific needs and specialization of the student. In short, students must complete Ph.D. course requirements, complete first and second year research projects, complete the technical seminar, fulfill the university residency requirement, pass the integrative review paper, pass the Ph.D. qualifying exam, and successfully

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defend the dissertation. Students should refer to Section VI.B: Doctoral Degree Requirements of the UC Merced Graduate Policies and Procedures Handbook for additional details on program requirements.

Though students may enter the program without a Master's degree, additional courses will be required equivalent to M.S. coursework requirements (24 units). If additional courses are required, students will work with their advisor and the graduate group chair to tailor a specific program of study.

Ph.D. students electing not to continue their graduate studies after completing 24 units of course requirements (foundations course (MIST 252), the graduate seminar (MIST 251), 16 units of graduate-level courses, at least two courses which must be in research methods) may elect to terminate with an M.S. degree by choosing and successfully completing either the M.S. exam or thesis option.

1)Program Learning Outcomes (PLOs): The goal is for the students to master MIST's cross-disciplinary management concepts and their application in a range of real-world problems, providing a solid basis for future academic and industry positions. There are five PLOs:

- *Foundations.* Students will apply disciplinary concepts and theories for framing and defining research questions and plans from business, management, economics, sociology, psychology, cognitive science, environmental science and engineering.
- *Methods.* Students will be able to apply contemporary social science and scientific methods needed to conduct rigorous research in their area of specialization.
- *Communication.* Students will communicate effectively to experts and non-experts, in professional (scientific and management) and community settings, preparing and delivering oral and written presentations using appropriate technologies.
- *Research Practice and Independence.* Students will be able to initiate and conduct independent research (e.g. review of literature, development of a research question and methodology, analysis, discussion, and conclusion) that makes an original contribution to knowledge, and which may be published in a peer reviewed outlet.
- *Research ethics and societal context.* Students will demonstrate familiarity with all aspects of research ethics and the societal context of their work.

2)Course Requirements - Core and Electives (26 units): Ph.D. students holding appropriate masters degrees must complete 26 units of course requirements (foundations course (MIST 252), the graduate seminar during two semesters (MIST 251), 20 units of graduate-level courses, at least two courses of which must be in research methods).

Ph.D. students without appropriate masters degrees must also complete the equivalent of the coursework requirements (i.e., complete a minimum of 24 units of courses at the upper division and graduate levels, with at least 20 units of graded graduate (200-level) courses in the major subject (with letter grade B or better).

- a) **Core Courses (6 units):** All Ph.D. students must take Foundations I and register for the Graduate Seminar for at least two semesters.

| Course No. | Title | Units |
|------------|------------------|-------|
| MIST 251 | Graduate Seminar | 2 |
| MIST 252 | Foundations I | 4 |

- b) **Elective Courses (20 units):** All Ph.D. students must take five graduate level courses, including at least two courses which must be in research methods. A current list of elective courses is maintained by the Graduate Group chair and available on the MCS webpage and provided below. Courses marked by an asterisk (*) qualify as research methods courses given their focus on quantitative or qualitative analysis and methodologies. Additional courses can qualify but require the approval of a student's faculty advisor and the MIST GG Chair.

| Course No. | Title | Units |
|------------|---|-------|
| MIST 201 | Leadership, Organizations, and Communications | 4 |
| MIST 202 | Managerial Finance and Accounting | 4 |
| MIST 203 | Quantitative Tools for Management | 4* |
| MIST 204 | Spatial Analytics | 4* |
| MIST 205 | Technology-Enabled Service | 4 |
| MIST 206 | Entrepreneurship and Innovation | 4 |
| MIST 207 | Project and Operations Management | 4 |
| MIST 208 | Law, Policy, and Risk Management | 4 |
| MIST 215 | Political Ecology and Complexity | 4 |
| MIST 218 | Social Reality | 4 |
| MIST 231 | Organizational Behavior | 4 |
| MIST 241 | Management Information Systems | 4 |
| MIST 253 | Foundations II | 4 |
| MIST 254 | Systems Thinking | 4 |
| MIST 260 | Research Methods | 4* |
| MIST 261 | Qualitative Methods | 4* |

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| MIST 264 | Energy Policy | 4 |
| MIST 270 | Data Science | 4* |
| MIST 271 | Network Science | 4* |
| MIST 295 | Graduate Student Research | 1-5 |
| COGS 204 | Complex Adaptative Systems | 4 |
| EECS 255 | Advanced Human-computer Interaction | 4* |
| ES 222 | Organic Matter | 3 |
| ES 232 | Applied Climatology | 3* |
| IH 203 | Pedagogy in Interdisciplinary Humanities | 4 |
| POLI 215 | Intro to Game Theory | 4* |
| PSY 202A | Advanced Psychological Statistics | 4 |
| SOC 205 | Graduate Writing & Publishing | 4 |
| SOC 210 | Graduate Statistics I: Linear Regression | 4* |
| SOC 215 | Graduate Research Methods | 4* |

c) Summary: Ph.D. students must satisfy the following course requirements. When necessary, students may consult with their advisors and advisory committee to identify particular courses that satisfy the requirements:

- A two-semester foundations program (Letter grade, B+ or better required)
- Enrollment in the MIST graduate seminar for two semesters (Letter grade, B+ or better required)
- A minimum of two graduate-level courses in research methods, for example in the areas of statistics, data analysis, computational modeling or survey methods. (Letter grade, B+ or better required)
- Three additional graduate-level courses, selected from the Electives course lists (Letter grade, B+ or better required)

3) Special Requirements: In addition to course requirements, prior to taking the qualifying exam, students must complete first- and second-year research projects and pass the integrative review paper.

i. **Language Requirement:** N/A.

ii. **Research Projects in First and Second Years:** Each student must give a presentation on a research project aligned with their dissertation work at

the end of their first and second full years in the program. Written scholarship of this research will also be provided to their advisors. Advisors will evaluate reports and presentations in terms of progress towards professional academic work in one or more areas of MIST. 1st and 2nd year reports will be given a grade of Pass, Conditional Pass, or Fail. Faculty must provide the first round of feedback by one month from submission of their respective reports, and the final grade by three months from submission.

4) Dissertation Plan: In accordance with University of California policy, a minimum of four semesters in academic residence is required prior to awarding the Ph.D. All graduate students are considered resident graduates not candidates for a degree, unless admitted to candidacy after completion of all candidacy requirements and approval by the Graduate Division after formal application. A student advances to candidacy for the Ph.D. upon successfully demonstrating a high level of scholarship at the Ph.D. level, and upon completing all preparatory work and demonstrating readiness to proceed to the dissertation phase.

5) Advising Structure and Mentoring: The graduate advisor is the faculty member who supervises the student's research and thesis. The Graduate Advisor, who is appointed by the MIST Graduate Group Chair, is a resource for information on academic requirements, policies and procedures, and registration information. The Graduate Group Staff assists students with identifying appointments and general university policies. In the case of separation between faculty mentor and student, the Graduate Chair assumes temporary mentoring responsibilities for the student. In such cases, the student will have one full semester to secure a main graduate advisor before falling into unsatisfactory progress. Mentoring guidelines can be found on the Graduate Division website: [UCM Mentoring Guidelines](#).

6) Doctoral Degree Committees

Ph.D. students will work closely with their advisory committees on 1st-year projects, 2nd-year-projects, an integrative review paper, qualifying exam, and doctoral dissertations. An advisory committee comprises at least three members, including at least one Core MIST faculty member as chair (typically the student's primary advisor). A second member must be either MIST Core or Affiliate faculty; other members may be MIST Core or Affiliate faculty, other UC faculty or similarly credentialed faculty from other institutions, as appropriate to support the student's area of research. A student will typically constitute the 1st-year project committee in Fall of the first year, the 2nd-year project committee in Fall of the second year, and the dissertation committee (including candidacy committee) in Fall of the third year. A student, along with his or her advisor, may elect to maintain the same committee over time or may elect to constitute a new committee for each requirement (with committee membership eligibility as described above). Advisory committees must be approved by the MIST Graduate Group Chair and the Graduate Dean.

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- a) **Candidacy Committee:** The Candidacy Committee comprises at least three members, including at least one Core MIST faculty member as chair (typically the student's primary advisor); a second member must be either MIST Core or Affiliate faculty; and other members may be MIST Core or Affiliate faculty, other UC faculty or similarly credentialed faculty from other institutions, as appropriate to support the student's area of research. The Candidacy Committee is charged with determining the fitness of the student to proceed with the doctoral dissertation through a formal Qualifying Examination. The student, in consultation with graduate advisor, nominates three faculty members to serve on the Candidacy Committee. These nominations are submitted to the Graduate Group Chair for formal appointment in accordance with Graduate Council policy. The Application for Qualifying Examination available on the Graduate Division website must be submitted one month prior to the proposed examination date. Students must be in good academic standing and registered for the semester in which the examination is held. The Candidacy Committee conducts the exam and submits results to the Graduate Division using the "Qualifying Examination Report Form."
 - b) **Doctoral Committee:** The Doctoral Committee consists of at least a three member committee. The majority of the committee must be affiliated with the MIST program. The role of the Dissertation Committee is to advise the doctoral student on the research topic and methods, and then to review the final completed dissertation for acceptance. The Doctoral Committee Chair should determine the desires of the individual members regarding assistance with the research and dissertation review at the time the doctoral committee is constituted. Students are expected to meet with the Chair of their doctoral committee regularly. Doctoral committee members are expected to read and comment on a dissertation within one month of submission. The student and faculty will coordinate a timeline for the student to present the thesis to the doctoral committee. This timeline must allow all doctoral committee members enough time to fulfill their responsibilities within the indicated deadline.
- 7) **Advancement to Candidacy:** The student is expected to advance to candidacy by the end of their third year. Students who enter the program without a Masters degree may require additional semesters to advance to candidacy. Before advancing to candidacy, a student must have satisfied all other requirements, must have maintained a minimum GPA of 3.0 in all course work undertaken. The student must file the appropriate paperwork ("Advance to Candidacy for the Degree of Doctor Philosophy Form" and "Conflict of Interest Form") with the Graduate Division and pay the candidacy fee in order to be officially promoted to Ph.D. Candidacy.
 - 8) **Qualifying Examination Requirements:** Students must pass a qualifying exam, typically at the end of their third year. Students who enter the program without a Masters degree may require additional semesters before taking their qualifying exam. The exam consists of a written dissertation proposal (about 8000 words in length) and an oral defense of the proposal, which takes place privately with the student's advisory

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committee. The oral defense may also include general questions about topics in MIST covered in the student's integrative review paper.

Conduct of the Exam. Although the formal Qualifying Examination for candidacy ordinarily is conducted in a single day, the Committee may meet intermittently over a longer period and may decide to reexamine the student on one or more topics after a specified interval. When the Committee meets to conduct the oral Qualifying Examination, it must report to the Graduate Council via the Vice Provost and Dean of Graduate Education within 30 days. Upon completion of the qualifying examination and all other Graduate Group requirements for Advancement to Candidacy, the results should be submitted to the Graduate Division on the "Qualifying Examination Report Form," which must be signed by all committee members at the time the qualifying examination is concluded. Prior to convening a student committee for advancement to qualifying exam, the Faculty Advisor, the Graduate Group Chair, and the graduate student must sign the "Statement on Conflict of Interest" form. If the unanimous recommendation of the Committee is favorable, the student must pay the current advancement to candidacy fee. The student must then submit the advancement to candidacy form to the Graduate Division. The candidate and graduate program will be notified of formal advancement and the appointment of a Doctoral Committee. Advancement to Candidacy begins with the first academic term following completion of all requirements (including submission of all forms).

Outcome of the Exam. Before voting upon its recommendation for or against candidacy, the Committee shall meet with the student, and any member of the Committee will have the right to pose appropriate questions to the student. The Committee must conclude its examination when convened with the student present. The committee, having reached a unanimous decision, shall inform the student of its decision to:

- **Pass.** A student has passed when the Qualifying Examination Committee unanimously votes that the student passed the entire examination with scholarship that is at least acceptable. The committee must report to the Graduate Council via the Vice Provost and Dean of Graduate Education within 30 days. If agreed unanimously by the committee the student may be allowed to make minor modifications prior to submitting the results of the examination.
- **Fail.** A student has failed when the Qualifying Examination Committee votes unanimously that the student failed the entire examination. The second examination may have a format different from the first, but the substance should remain the same. A student whose performance on the second attempt is also unsatisfactory, or who does not undertake a second examination within a reasonable period of time, is subject to academic disqualification. A third examination may be given only with the approval of the Graduate Group committee and the Vice Provost and Dean of Graduate Education.
- **Partial Pass.** A student has partially passed when the Qualifying Examination Committee votes that the student passed some components but failed others. This may also involve non-unanimous decisions (or split-decisions) from the

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committee. In this instance, the student has the option of taking a second examination as detailed in above on the components failed, and the chair of the committee must write a letter to the student, with a copy to the Graduate Division, conveying the information about the student's performance (pass, fail, or partial pass) on each of the components covered during the examination.

If decision is "Partial Pass" or "Fail", the Chair of the Candidacy Committee must include in its report a specific statement, agreed to by all members of the committee, explaining its decision and must inform the student of its decision.

- 9) **Dissertation Requirements:** Students must successfully complete a written doctoral dissertation containing an original contribution to scientific knowledge in some domain related to management of innovation, sustainability, and technology in the context of complex coupled human-natural systems. The dissertation should contain material of a quality that is worthy of scholarly publication and must be formatted according to campus guidelines for dissertation manuscripts. The student must also give an oral presentation of the dissertation that is open to the campus community, and the presentation may be followed by a private session of questions and discussion with the advisory committee. The Committee recommendation must be unanimous.

The dissertation must be submitted to each member of the dissertation committee at least one month before the student expects to make the defense. Informing committee members of progress as writing proceeds helps the members to plan to read the dissertation and provide feedback.

Upon completion of the final examination and approval of the dissertation, the Doctoral Committee recommends, by submission of the "Report on Final Examination of the Ph.D. Degree Form", the conferral of the Ph.D. subject to final submission of the approved dissertation for deposit in the University Archives.

All dissertations submitted in fulfillment of requirements for advanced degrees at UC Merced must conform to certain University regulations and specifications with regard to format and method of preparation. Filing instructions are found in the UC Merced Thesis and Dissertation Manual. The end of the semester is the deadline for submitting dissertations during each semester. Those students who complete requirements and submit dissertations after the end of the semester and prior to the start of the subsequent semester will earn a degree for the following semester but will not be required to pay fees for that semester. In accordance with UC and UC Merced policy, all approved dissertation manuscripts automatically become available for public access and circulation as part of the UC Libraries collections.

- 10) **Normative Time to Degree:** Expected normative time for completion of the Ph.D. is 4 years for students who enter with an appropriate M.S. and 5 years for students who do not.

11) Typical Timeline and Sequence of Events

Year 1

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Fall MIST 252 (4), Elective I (4), MIST 295 (4)

Spring MIST 251 (1), Methods I (4), Elective II (4), MIST 295 (4), 1st-year Project

Year 2

Fall: MIST 251 (1), Elective III (4), MIST 295 (8)

Spring MIST 251 (1), Methods II (4), MIST 295 (8), 2nd-year Project

Year 3

Fall MIST 295 (12)

Spring MIST 295 (12), Qualifying Exam

Year 4

Fall MIST 295 (12)

Spring MIST 295 (12), Dissertation Defense

- 12) **Sources of Funding:** Graduate students who received a funding offer with their admissions offer will have their financial support according to the terms of the funding offer. Funding will come through a combination of Teaching Assistantships, Graduate Research Assistantships, and/or Fellowships. More information on financial support can be found in the [Graduate Policies and Procedures Handbook](#).
- 13) **Leaving the Program Prior to Completion of the PhD Requirements:** A student admitted for the Ph.D. degree, which, in the judgment of the faculty should not continue past the master's degree, must be notified in writing by the Graduate Group Chair of the Graduate Group offering the degree. A copy of the letter must be sent to the Vice Provost and Dean of Graduate Education. In some cases, a doctoral student may choose to leave the program with only a master's degree.

D. General Information

1) PELP, In Absentia and Filing Fee status.

Information about PELP (Planned Educational Leave Program), In Absentia (reduced fees when researching out of state), and Filing Fee status can be found in the [Graduate Group Policies and Procedures Handbook](#)