米国大学の工学教育

大原憲明
ワイオミング大学准教授

1. ワイオミング大学における学部レベルの教育プログラム
2. ワイオミング大学とカリフォルニア大学の大学院の教育プログラム
3. NCEES (FE exam)とABETによる外部からの承認システム
4. 教員の採用システムと昇進制度
5. 工学教育の近年のトレンドと新しい試み

The State of Wyoming


FedEx

University of Wyoming

Type	Public flagship Land grant
Established:	1886
Academic staff:	1,151
Administrative staff:	1,846
Students:	13,992
Athletics:	NCAA Division I – MWC
Nickname:	Cowboys and Cowgirls

INSTITUTIONAL AGREEMENTS

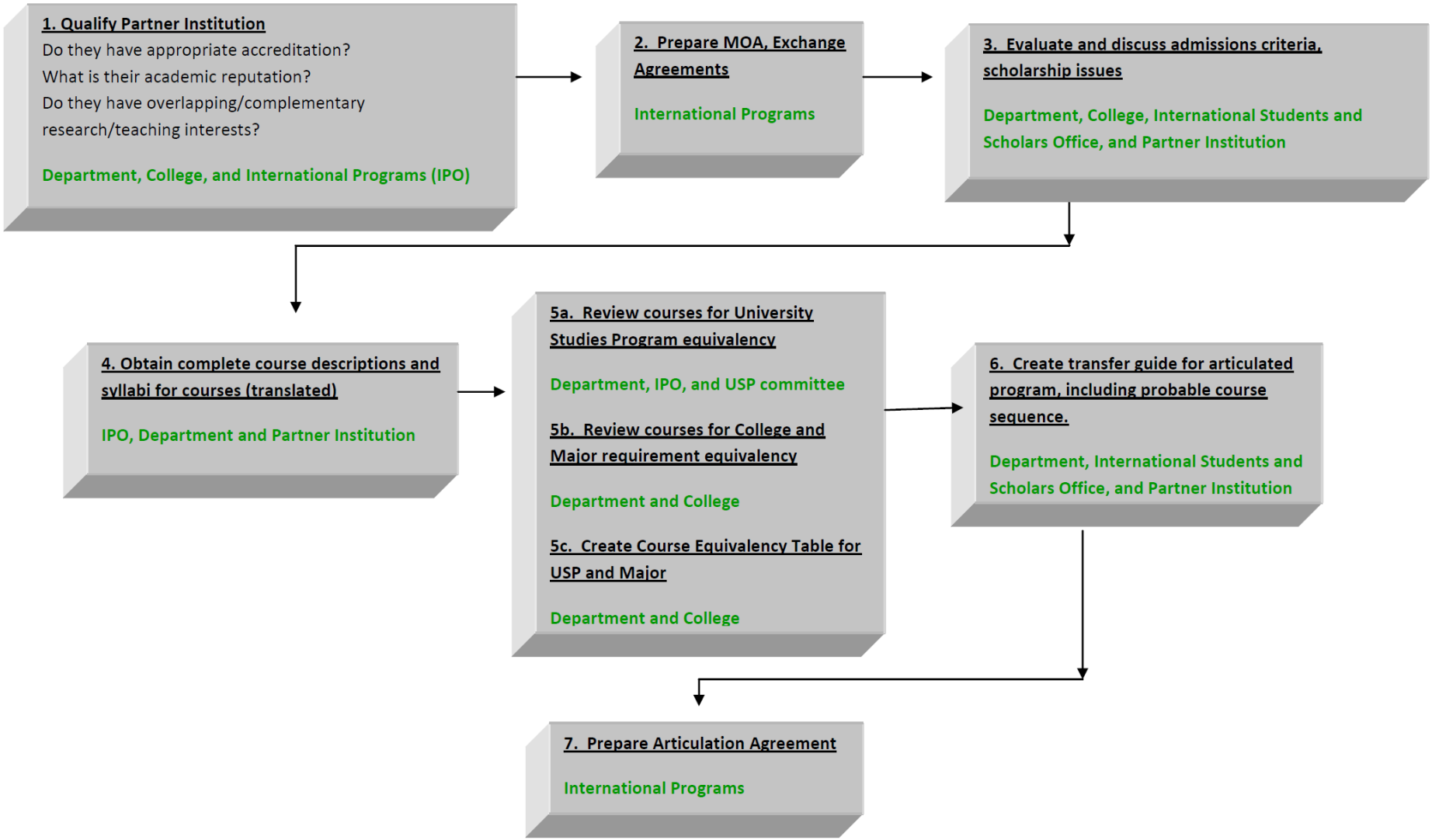
- Kobe College　　（神戸女学院大学）
- Tohoku University（東北大学）
- Hyogo University Mobility in Asia and the Pacific （兵庫･アジア太平洋大学間交流ネットワーク）
- Asia Pacific University （立命館アジア太平洋大学）

http://www.uwyo.edu/geo/mou/index.html

Operating documents resulting from this process:

- Memorandum of Agreement
- Exchange Agreement
- USP Course Equivalency Table
- Major Course Equivalency Table
- Probable Course Sequence
- Transfer Guide
- Articulation Agreement

Carrie Hesco, chesco@uwyo.edu
Anne Alexander, aalex@uwyo.edu


1. Qualify Partner Institution
Do they have appropriate accreditation?
What is their academic reputation?
Do they have overlapping/complementary research/teaching interests?
Department, College, and International Programs (IPO)
2. Prepare MOA, Exchange Agreements
International Programs
3. Evaluate and discuss admissions criteria, scholarship issues
Department, College, International Students and Scholars Office, and Partner Institution
4. Obtain complete course descriptions and syllabi for courses (translated)
IPO, Department and Partner Institution
5a. Review courses for University Studies Program equivalency
Department, IPO, and USP committee
5b. Review courses for College and Major requirement equivalency
Department and College
5c. Create Course Equivalency Table for USP and Major
Department and College
6. Create transfer guide for articulated program, including probable course sequence.
Department, International Students and Scholars Office, and Partner Institution
7. Prepare Articulation Agreement
International Programs

Civil & Architectural Engineering

www.eng.uwyo.edu/civil

UNIVERSITY OF WYOMING

Civil & Architectural Engineering at UW

20 Faculty

Civil Engineering
ABET-Accredited
4-year program
170 Students

Architectural Engineering
ABET-Accredited
4-year program
130 Students

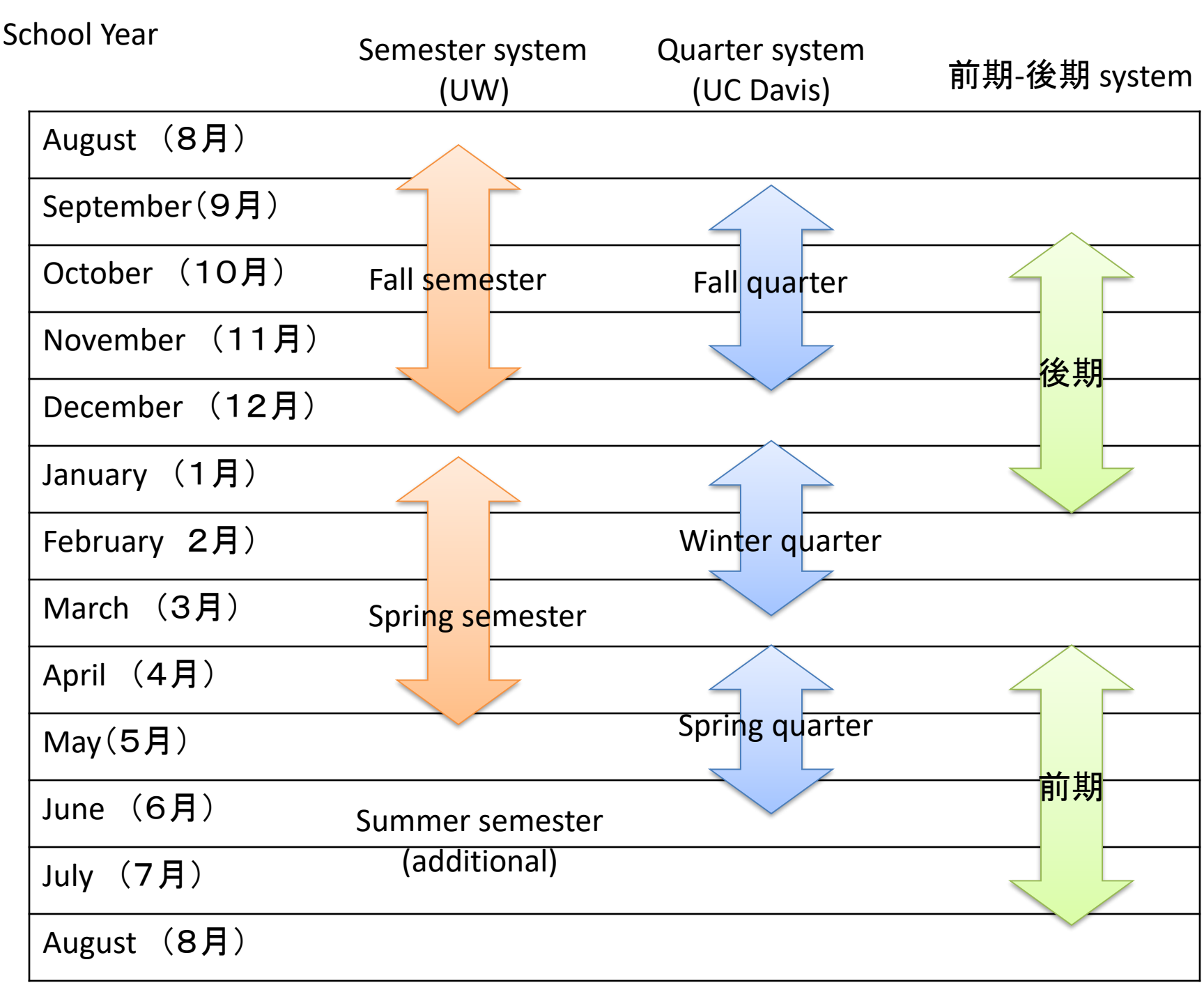
Student-to-Faculty Ratio: 16:1

Civil & Architectural Engineering at UW

Curriculum info here:
www.uwyo.edu/civil/curriculum/advising/

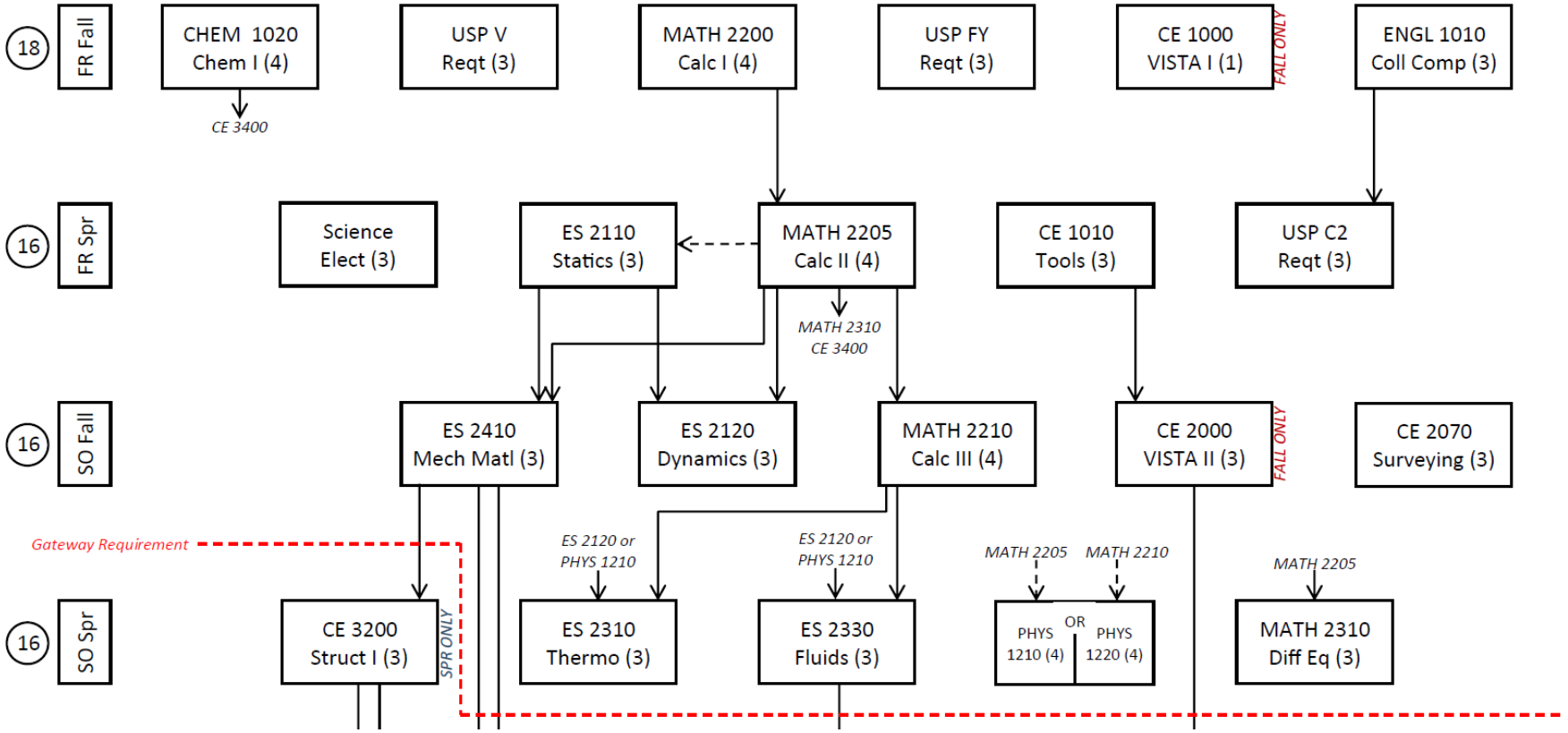
Both programs:
- 129 credits
- Heavy on Math/Science
- Start with Calculus I

Add-Ons:
- Honors Program
- International Option
- Minors


School Year
Semester system (UW)
Quarter system (UC Davis)
前期-後期 system
August （8月）
September（9月）
October （10月）
November （11月）
December （12月）
January （1月）
February 2月）
March （3月）
April （4月）
May（5月）
June （6月）
July （7月）
August （8月）
Fall semester
Fall quarter
後期
Winter quarter
Spring semester
Spring quarter
前期
Summer semester (additional)

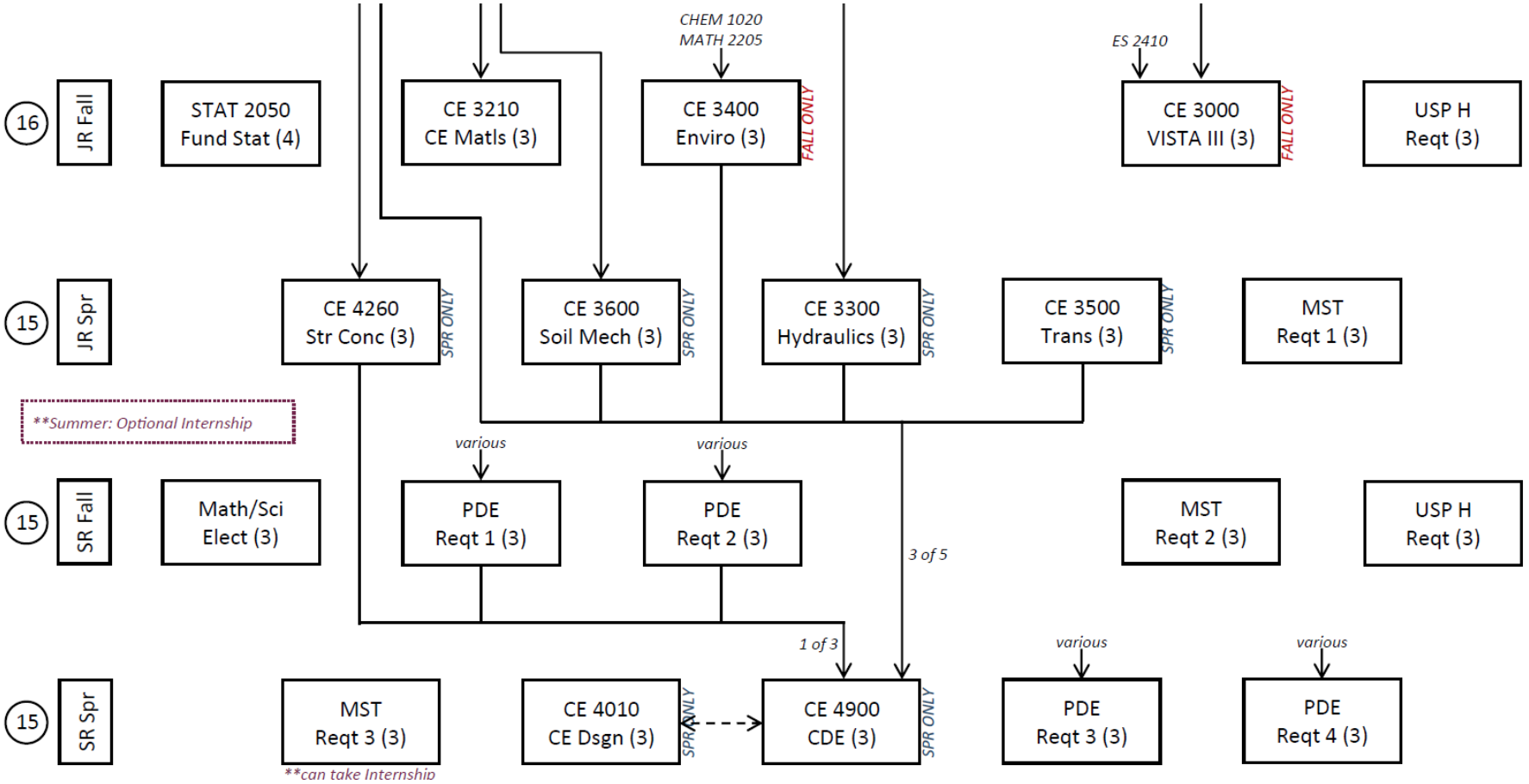
Curriculum
Example of Civil Engineering
(First 2 years)

1年生 = Freshman
2年生 = Sophomore
3年生 = Junior
4年生 = Senior

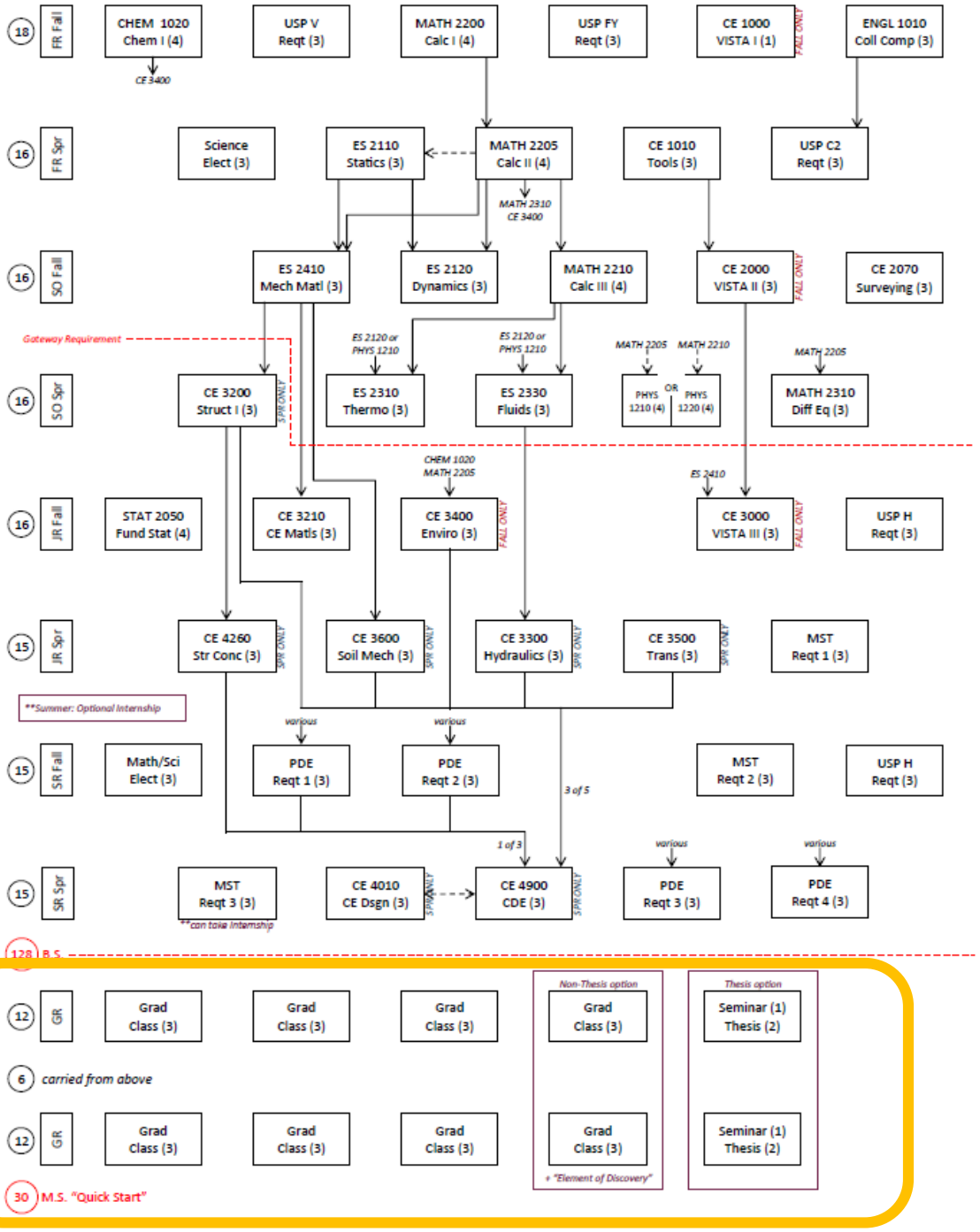


Curriculum
Example of Civil Engineering
(Second 2 years)

1年生 = Freshman
2年生 = Sophomore
3年生 = Junior
4年生 = Senior

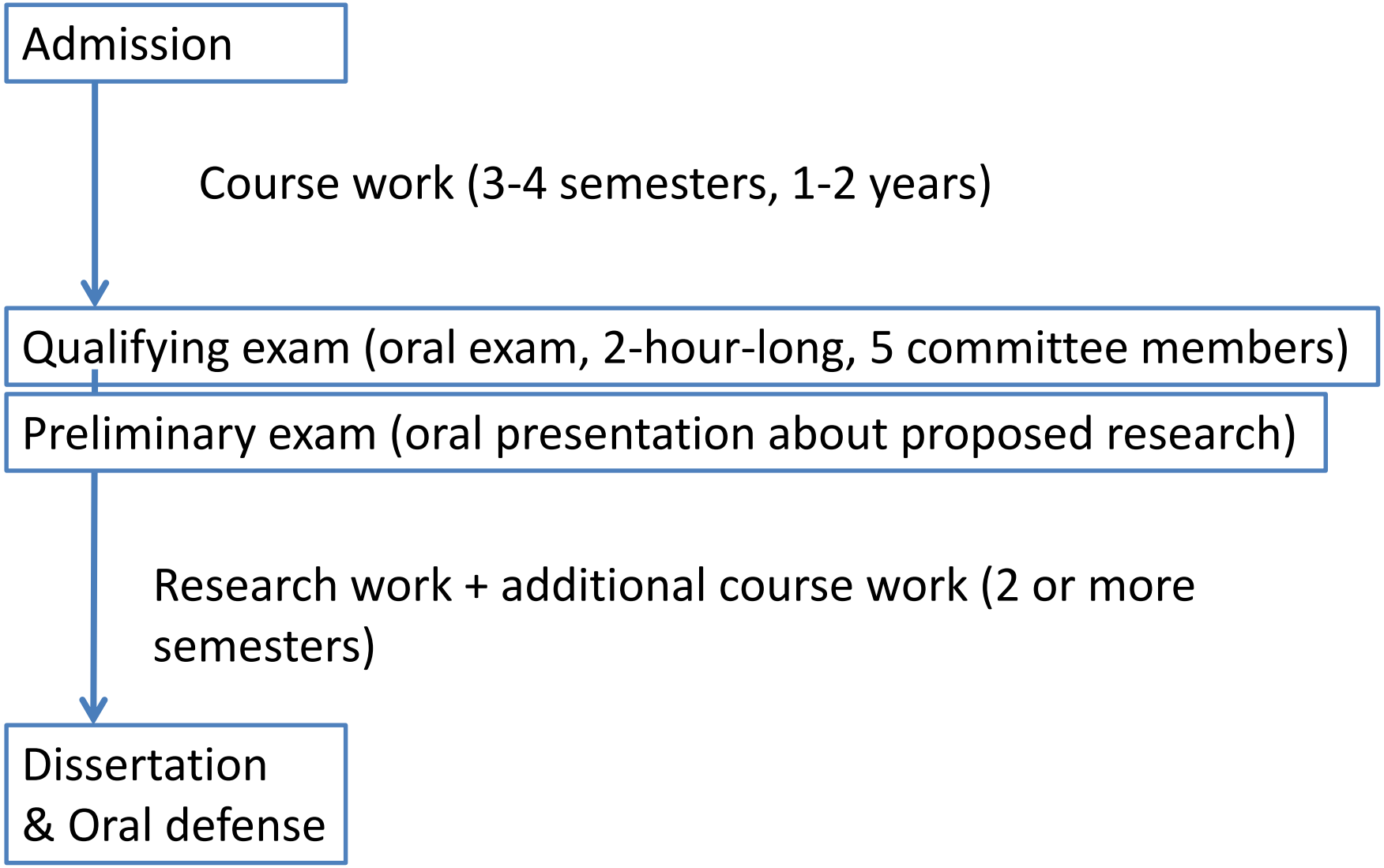


Quick Start program
= 1 year M.S. degree

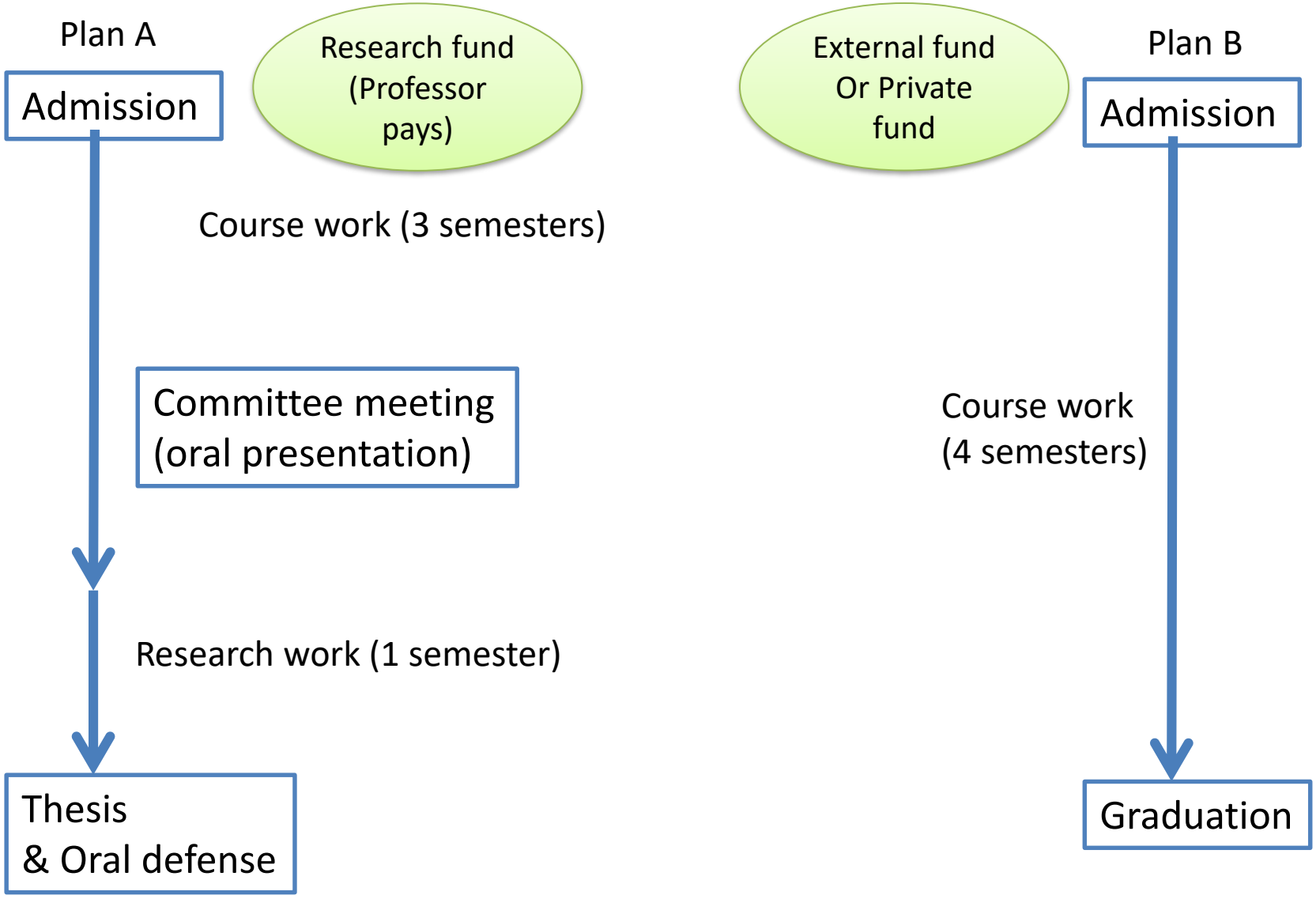


Graduate program

Ph.D. program in the UW



M.S. program in the UW



Graduate program in the UW

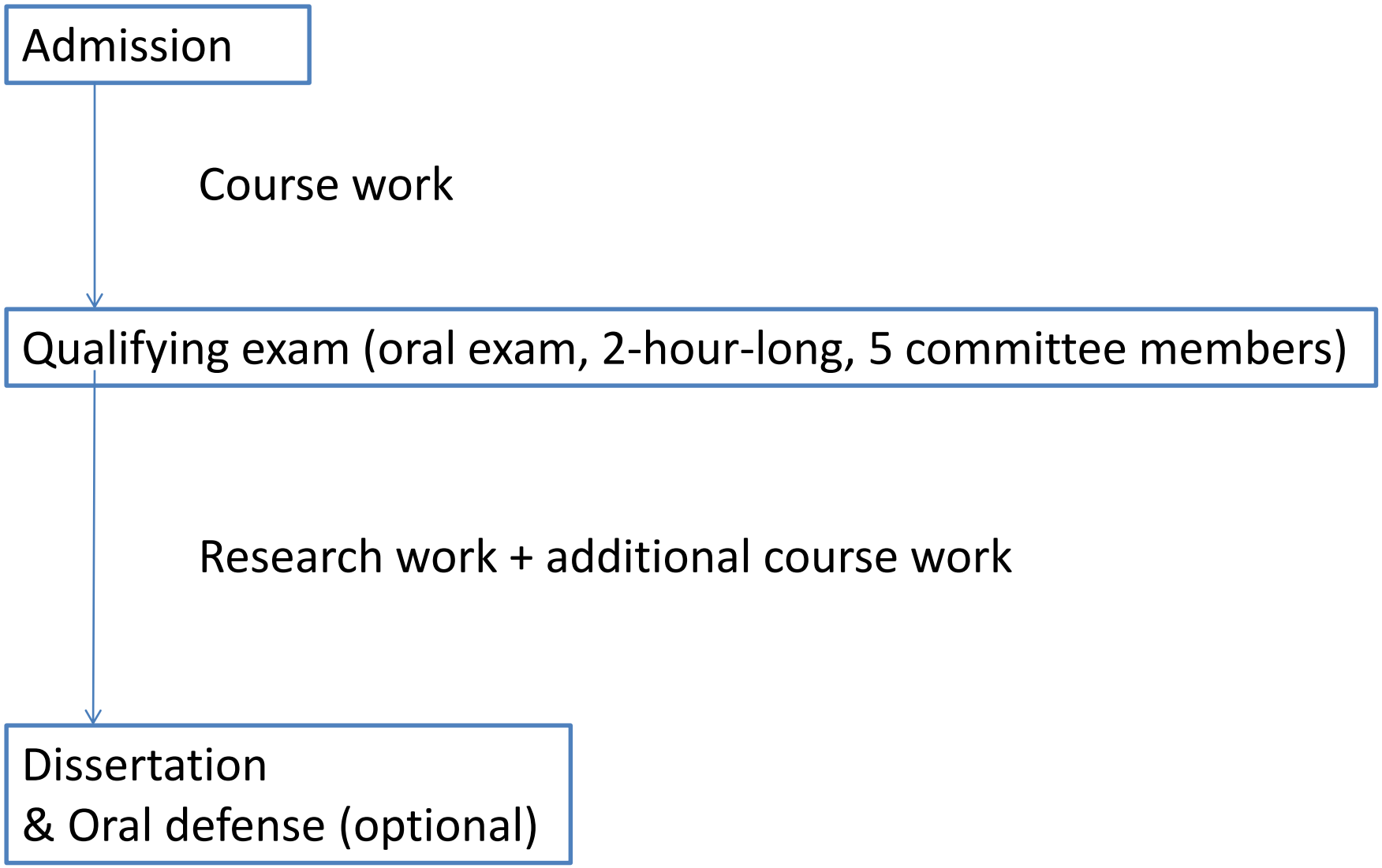
- Proof of Financial Support
- TOEFL : 540 on the written exam or 76 on the Internet-based test or IELTS scores: 6.5 or better.
- GRE exam score
- Three letters of recommendation
- Transcript (GPA 3.0 or better)
- Application Deadline – 3/1 & 10/15 (flexible)

UCDAVIS

CIVIL AND ENVIRONMENTAL ENGINEERING

WELCOME TO CIVIL AND ENVIRONMENTAL ENGINEERING

Ph.D. program in the UC Davis



Graduate program in the UC Davis

- Proof of Financial Support
- TOEFL : 550 on the written exam or 80 on the Internet-based test or IELTS scores: 7.0 or better.
- GRE exam score
- Three letters of recommendation
- Transcript (GPA 3.0 or better)
- Application Deadline – 2/1/2019 (flexible)

Cost

UW

Undergraduate student
Tuition & Fee: $17,750
Living cost: $ 14,120
Total: $31,870

Graduate student
Tuition & Fee: $15,500
Living cost : $ 14,120
Total: $29,620

UC Davis

Undergraduate student
Tuition & Fee: $42,433 (out of state)
Living cost: $ 14,175
Total: $56,608

Graduate student
Tuition & Fee: $28,709 (out of state)
Living cost : $ 14,175
Total: $42,884

TA and RA-ship can cover all cost for graduate student

外部からの承認システム

外部からの承認システム

- NCEES (FE exam)
- ABET

PROFESSIONAL LICENSURE

Noriaki Ohara
Assistant Professor
Civil and Architectural Engineering
University of Wyoming

WHAT IS A LICENSED ENGINEER?

- Having an engineering license means more than just meeting a state's minimum requirements.
- It means you have accepted both the technical and the **ethical obligations** of the engineering profession.
- The professional engineer license grants you the opportunity to perform engineering services for the public and have the privilege of applying your state-authorized engineering seal to your engineering work.
- With this privilege comes the obligation to take responsibility for your designs, reports, professional opinions, and plans.

WHAT ARE LICENSING REQUIREMENTS IN THE UNITED STATES?

- 1. Graduating from an **ABET** accredited engineering program or an ABET accredited engineering technology program in some states;
- 2. Passing the national Fundamentals of Engineering **(FE) exam** offered by the National Council of Examiners for Engineering and Surveying (NCEES);
- 3. Obtaining **four years** (or three years past a masters degree in some states) of acceptable engineering **experience** with increasing levels of responsibility, under the guidance of one or more licensed engineers;
- 4. Submitting a detailed **application** documenting, among other things, a progressive increase in responsible professional experience and including both professional and character references; and
- 5. Passing the Principles and Practice of Engineering **(PE) exam** offered by NCEES. Some states have an additional exam offered by the state board that covers its principles of conduct and ethics

FE exam is **required** for graduation in the Applied Science and Engineering Collage.

Exam	Volume	Pass rate
FE Chemical	1076	74%
FE Civil	6062	69%
FE Electrical and Computer	1399	71%
FE Environmental	807	76%
FE Industrial and Systems	300	61%
FE Mechanical	4559	77%
FE Other Disciplines	1289	74%

FUNDAMENTALS OF ENGINEERING (FE) EXAM

The FE exam includes 110-questions. The exam appointment time is 6 hours long and includes

- Nondisclosure agreement (2 minutes)
- Tutorial (8 minutes)
- Exam (5 hours and 20 minutes)
- Scheduled break (25 minutes)

The FE exam uses both the International System of Units (SI) and the US Customary System (USCS).

Knowledge	Number of Questions
1. Mathematics	**7–11**
A. Analytic geometry	
B. Calculus	
C. Roots of equations	
D. Vector analysis	
2. Probability and Statistics	**4–6**
A. Measures of central tendencies and dispersions (e.g., mean, mode, standard deviation)	
B. Estimation for a single mean (e.g., point, confidence intervals)	
C. Regression and curve fitting	
D. Expected value (weighted average) in decision making	
3. Computational Tools	**4–6**
A. Spreadsheet computations	
B. Structured programming (e.g., if-then, loops, macros)	
4. Ethics and Professional Practice	**4–6**
A. Codes of ethics (professional and technical societies)	
B. Professional liability	
C. Licensure	
D. Sustainability and sustainable design	
E. Professional skills (e.g., public policy, management, and business)	
F. Contracts and contract law	
5. Engineering Economics	**4–6**
A. Discounted cash flow (e.g., equivalence, PW, equivalent annual worth, FW, rate of return)	
B. Cost (e.g., incremental, average, sunk, estimating)	
C. Analyses (e.g., breakeven, benefit-cost, life cycle)	
D. Uncertainty (e.g., expected value and risk)	
6. Statics	**7–11**
A. Resultants of force systems	
B. Equivalent force systems	
C. Equilibrium of rigid bodies	
D. Frames and trusses	
E. Centroid of area	
F. Area moments of inertia	
G. Static friction	

7.	**Dynamics**	**4–6**
	A. Kinematics (e.g., particles and rigid bodies)	
	B. Mass moments of inertia	
	C. Force acceleration (e.g., particles and rigid bodies)	
	D. Impulse momentum (e.g., particles and rigid bodies)	
	E. Work, energy, and power (e.g., particles and rigid bodies)	
8.	**Mechanics of Materials**	**7–11**
	A. Shear and moment diagrams	
	B. Stresses and strains (e.g., axial, torsion, bending, shear, thermal)	
	C. Deformations (e.g., axial, torsion, bending, thermal)	
	D. Combined stresses	
	E. Principal stresses	
	F. Mohr's circle	
	G. Column analysis (e.g., buckling, boundary conditions)	
	H. Composite sections	
	I. Elastic and plastic deformations	
	J. Stress-strain diagrams	
9.	**Materials**	**4–6**
	A. Mix design (e.g., concrete and asphalt)	
	B. Test methods and specifications (e.g., steel, concrete, aggregates, asphalt, wood)	
	C. Physical and mechanical properties of concrete, ferrous and nonferrous metals, masonry, wood, engineered materials (e.g., FRP, laminated lumber, wood/plastic composites), and asphalt	
10.	**Fluid Mechanics**	**4–6**
	A. Flow measurement	
	B. Fluid properties	
	C. Fluid statics	
	D. Energy, impulse, and momentum equations	
11.	**Hydraulics and Hydrologic Systems**	**8–12**
	A. Basic hydrology (e.g., infiltration, rainfall, runoff, detention, flood flows, watersheds)	
	B. Basic hydraulics (e.g., Manning equation, Bernoulli theorem, open-channel flow, pipe flow)	
	C. Pumping systems (water and wastewater)	
	D. Water distribution systems	
	E. Reservoirs (e.g., dams, routing, spillways)	
	F. Groundwater (e.g., flow, wells, drawdown)	
	G. Storm sewer collection systems	

12. Structural Analysis **6–9**

A. Analysis of forces in statically determinant beams, trusses, and frames
B. Deflection of statically determinant beams, trusses, and frames
C. Structural determinacy and stability analysis of beams, trusses, and frames
D. Loads and load paths (e.g., dead, live, lateral, influence lines and moving loads, tributary areas)
E. Elementary statically indeterminate structures

13. Structural Design **6–9**

A. Design of steel components (e.g., codes and design philosophies, beams, columns, beam-columns, tension members, connections)
B. Design of reinforced concrete components (e.g., codes and design philosophies, beams, slabs, columns, walls, footings)

14. Geotechnical Engineering **9–14**

A. Geology
B. Index properties and soil classifications
C. Phase relations (air-water-solid)
D. Laboratory and field tests
E. Effective stress (buoyancy)
F. Stability of retaining walls (e.g., active pressure/passive pressure)
G. Shear strength
H. Bearing capacity (cohesive and noncohesive)
I. Foundation types (e.g., spread footings, deep foundations, wall footings, mats)
J. Consolidation and differential settlement
K. Seepage/flow nets
L. Slope stability (e.g., fills, embankments, cuts, dams)
M. Soil stabilization (e.g., chemical additives, geosynthetics)
N. Drainage systems
O. Erosion control

15. Transportation Engineering **8–12**

A. Geometric design of streets and highways
B. Geometric design of intersections
C. Pavement system design (e.g., thickness, subgrade, drainage, rehabilitation)
D. Traffic safety
E. Traffic capacity
F. Traffic flow theory
G. Traffic control devices
H. Transportation planning (e.g., travel forecast modeling)

16. Environmental Engineering 6–9

A. Water quality (ground and surface)
B. Basic tests (e.g., water, wastewater, air)
C. Environmental regulations
D. Water supply and treatment
E. Wastewater collection and treatment

17. Construction 4–6

A. Construction documents
B. Procurement methods (e.g., competitive bid, qualifications-based)
C. Project delivery methods (e.g., design-bid-build, design build, construction management, multiple prime)
D. Construction operations and methods (e.g., lifting, rigging, dewatering and pumping, equipment production, productivity analysis and improvement, temporary erosion control)
E. Project scheduling (e.g., CPM, allocation of resources)
F. Project management (e.g., owner/contractor/client relations)
G. Construction safety
H. Construction estimating

18. Surveying 4–6

A. Angles, distances, and trigonometry
B. Area computations
C. Earthwork and volume computations
D. Closure
E. Coordinate systems (e.g., state plane, latitude/longitude)
F. Leveling (e.g., differential, elevations, percent grades)

The FE exam is a computer-based test (CBT). It is closed book with an electronic reference.

Examinees have 6 hours to complete the exam.

FE EXAM STRATEGIES – BEFORE THE EXAM

- Download or use hard copy of FE Supplied Reference Manual
  - Become familiar with topics listed
  - Practice using it
- Obtain an approved calculator
  - **Casio:** All fx-115 models. Any Casio calculator must contain fx-115 in its model name.
  - **Hewlett Packard:** The HP 33s and HP 35s models, but no others.
  - **Texas Instruments:** All TI-30X and TI-36X models
- Become familiar with the approved calculator that you will use.

https://ncees.org/exams/test-center-locations/

University of Wyoming Testing Center

1000 E. University Avenue

Dept. 3195

Knight Hall Basement, Rm 04

Laramie, Wyoming 82071

United States

ABET

Introduction to ABET Accreditation

Noriaki Ohara

Topics

- Basics of ABET Accreditation
  - Process
  - Criteria
  - Continuous Quality Improvement

ABET

Basics of ABET Accreditation

ABET Accreditation Process

Objectives

- Assure that graduates of an accredited program are adequately prepared to enter and continue the practice of applied science, computing, engineering, and engineering technology
- Stimulate the improvement of technical education
- Encourage new and innovative approaches to technical education and its assessment

ABET Accreditation Process

ABET Accreditation Process

- Programs prepare Self-Study Report for evaluation team
  - Documents how the program meets criteria
- Program review conducted by team of peer colleagues
  - Faculty, industry and government professionals, and administrators in the profession
  - Review the Self-Study Report, conduct the review visit
- ABET Program Evaluators (PEVs)
  - 2,200+ volunteers from academe, industry, and government (individual members of ABET Member Societies)

Accreditation Timeline

18-21* Month Process

Criteria: The Guiding Principles of Accreditation Decisions

General Criteria

1) Students
2) Program Educational Objectives
3) Student Outcomes
4) Continuous Improvement
5) Curriculum
6) Faculty
7) Facilities
8) Institutional Support

Plus, Program Criteria

Harmonization of Criteria

Criteria Common to All Commissions	Commission-Specific Criteria
Criterion 1 (Students)	
Criterion 2 (PEO)	Criterion 3 (Outcomes)
Criterion 4 (CQI)	Criterion 5 (Curriculum)
	Criterion 6 (Faculty)
Criterion 7 (Facilities)	
Criterion 8 (Support)	Program Criteria

Criterion 1
Students

- Student performance must be evaluated.
- Student progress must be monitored to foster success in attaining student outcomes.
- Program must have and enforce policies for accepting both new and transfer students, awarding appropriate academic credit for courses taken at the institution and other institutions.
- Program must have and enforce procedures to ensure and document that students who graduate meet all graduation requirements.

Criterion 2
Program Educational Objectives

- The program must have published program educational objectives.
  - Consistent with the mission of the institution, the needs of the program's various constituents, and the criteria
  - There must be a documented, systematically utilized, and effective process, involving program constituencies, for the periodic review of these program educational objectives that ensures they remain consistent with the institutional mission, the program's constituents' needs, and these criteria.

Criterion 3
Student Outcomes (slide 5)

- For baccalaureate degree programs, student outcomes must include, but are not limited to:
  a) an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities
  b) an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies
  c) an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes

Criterion 3

Student Outcomes (slide 6)

d) an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives

e) an ability to function effectively as a member or leader on a technical team

f) an ability to identify, analyze, and solve broadly-defined engineering technology problems

g) an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature

Criterion 3

Student Outcomes (slide 7)

h) an understanding of the need for and an ability to engage in self-directed continuing professional development

i) an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity

j) a knowledge of the impact of engineering technology solutions in a societal and global context

k) a commitment to quality, timeliness, and continuous improvement

Criterion 4
Continuous Improvement

- The program must regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are being attained
- The results of these evaluations must be systematically utilized as input for the continuous improvement of the program. Other available information may also be used to assist in the continuous improvement of the program.

Criterion 5
Curriculum (slide 1)

- The curriculum must effectively develop the following subject areas in support of student outcomes and program educational objectives.
- Program must develop ability of students to apply mathematics to solutions of technical problems.
  - Associate degree programs will, at a minimum, include algebra and trigonometry at a level appropriate to the student outcomes and program educational objectives.
  - Baccalaureate degree programs will include the application of integral and differential calculus or other mathematics above the level of algebra and trigonometry appropriate to the student outcomes and program educational objectives.

Criterion 5
Curriculum (slide 2)

- Technical content of program must focus on the applied aspects of science and engineering.
  - Represent at least 1/3 of the total credit hours for the program but no more than 2/3 of the total credit hours for the program.
  - Include a technical core that prepares students for the increasingly complex technical specialties they will experience later in the curriculum.
  - Develop student competency in the use of equipment and tools common to the discipline.

Criterion 5
Curriculum (slide 3)

- The basic science content of the program must include physical or natural science with laboratory experiences as appropriate to the discipline.
- Baccalaureate degree programs must provide a capstone or integrating experience that develops student competencies in applying both technical and non-technical skills in solving problems.

Criterion 5
Curriculum (slide 4)

- When used to satisfy prescribed elements of these criteria, credits based upon cooperative/internships or similar experiences must include an appropriate academic component evaluated by the program faculty.
- An advisory committee with representation from organizations being served by the program graduates must be utilized to periodically review the program's curriculum and advise the program on the establishment, review, and revision of its program educational objectives. The advisory committee must provide advisement on current and future aspects of the technical fields for which the graduates are being prepared.

Criterion 6
Faculty

- Each faculty member teaching in the program must have expertise and educational background consistent with the contributions to the program expected from the faculty member.
- The competence of faculty members must be demonstrated by such factors as education, professional credentials and certifications, professional experience, ongoing professional development, contributions to the discipline, teaching effectiveness, and communication skills.
- Collectively, the faculty must have the breadth and depth to cover all curricular areas of the program.

Criterion 6
Faculty

- The faculty serving in the program must be of sufficient number to maintain continuity, stability, oversight, student interaction, and advising.
- The faculty must have sufficient responsibility and authority to improve the program through definition and revision of program educational objectives and student outcomes as well as through the implementation of a program of study that fosters the attainment of student outcomes.

Criterion 7
Facilities

- Classrooms, offices, laboratories, and equipment must be adequate to support attainment of student outcomes and to provide an atmosphere conducive to learning.
- Modern tools, equipment, computing resources, and labs must be available, accessible, and systematically maintained and upgraded to enable the student outcomes and to support program needs.
- Students must be provided appropriate guidance regarding use of the tools, equipment, computing resources, and laboratories available to the program.
- Library services and the computing and information infrastructure must be adequate to support the scholarly and professional activities of the students and faculty.

Criterion 8
Institutional Support

- Institutional support and leadership must be adequate to ensure the quality and continuity of the program.
- Institutional services, financial support, and staff (both administrative and technical) provided to the program must be adequate to meet program needs.
- Resources available to the program must be sufficient to attract, retain, and provide for the continued professional development of a qualified faculty.
- Resources must be sufficient to acquire, maintain, and operate infrastructures, facilities and equipment appropriate for the program, so that student outcomes can be attained.

Program Criteria （条件）

- Each program seeking accreditation from the Engineering Technology Accreditation Commission of ABET must demonstrate that it satisfies all Program Criteria implied by the program title.

Program Shortcomings

- Concern（懸念）: A concern indicates that a program currently satisfies a criterion, policy, or procedure; however, the potential exists for the situation to change such that the criterion, policy, or procedure may not be satisfied.

Program Shortcomings

- Weakness（弱点）: A weakness indicates that a program lacks the strength of compliance with a criterion, policy, or procedure to ensure that the quality of the program will not be compromised. Therefore, remedial action is required to strengthen compliance with the criterion, policy, or procedure prior to the next evaluation.

Program Shortcomings

- Deficiency （不足・不十分）: A deficiency indicates that a criterion, policy, or procedure is not satisfied. Therefore, the program is not in compliance with the criterion, policy, or procedure.

Continuous Quality Improvement

Continuous Quality Improvement (CQI)
継続的な質の向上

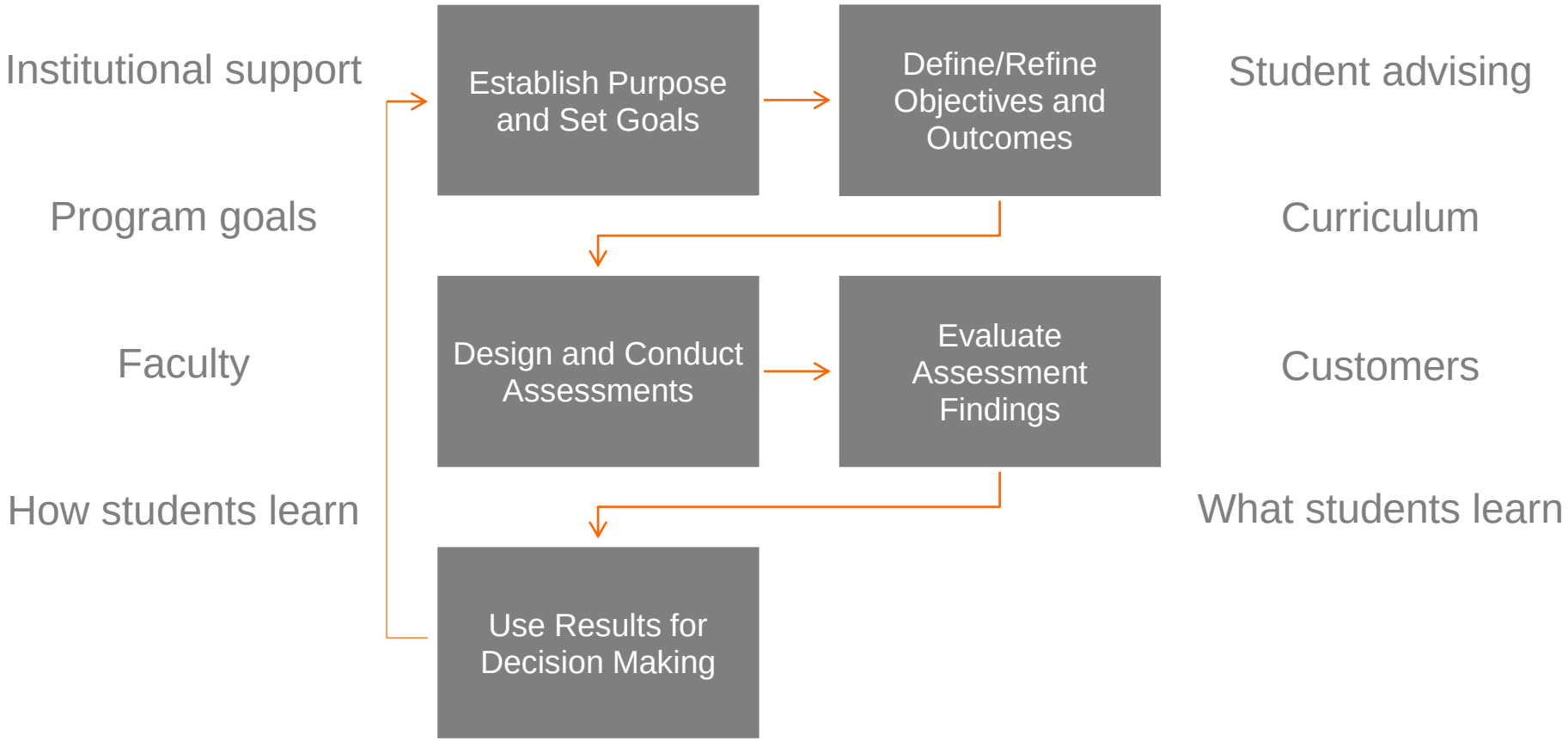
- ABET criteria have been developed on the principles of continuous quality improvement.
- On-going process at institution to improve quality of student's educational experience
  - Systematic process: documented, repeatable
  - Assess performance against criteria
  - Take actions to improve program
- Accreditation is a **part** of CQI.
  - Verification that program meets certain level of quality, and CQI is part of the quality process.

Continuous Quality Improvement (CQI Process)

- CQI process includes a clear understanding of:
  - Mission (your purpose)
  - Constituents (your customers)
  - Objectives (what one is trying to achieve)
  - Outcomes (learning that takes place to meet objectives)
  - Processes (internal practices to achieve the outcome)
  - Facts (data collection)
  - Evaluation (interpretation of facts)
  - Action (change, improvement)

Assessment

How Well Are We Doing?



Assessment

Common Issues (slide 1)

- Faculty and/or staff fail to put adequate attention to what data need to be gathered to assess and evaluate, especially for student outcomes. （教員の十分な理解にかけている）
  - Common mistake: gathering much more data than needed
  - Failure to logically evaluate data prevents reasonable conclusion that an objective or outcome is being attained

Assessment

Common Issues (slide 2)

- Many large programs hand off all assessment activities to a staff person (some qualified, some not) (丸投げ).
  - Program evaluators look for faculty knowledge of processes and results.
  - Experience shows that most (preferably all) faculty members must be involved for the requirements of Criterion 4 (Continuous Improvement) to be fully met.

Resources

IDEAL℠

Institute for the Development of Excellence in Assessment Leadership (IDEAL)

Program Assessment Workshops

Intensive, Interactive Daylong Workshops

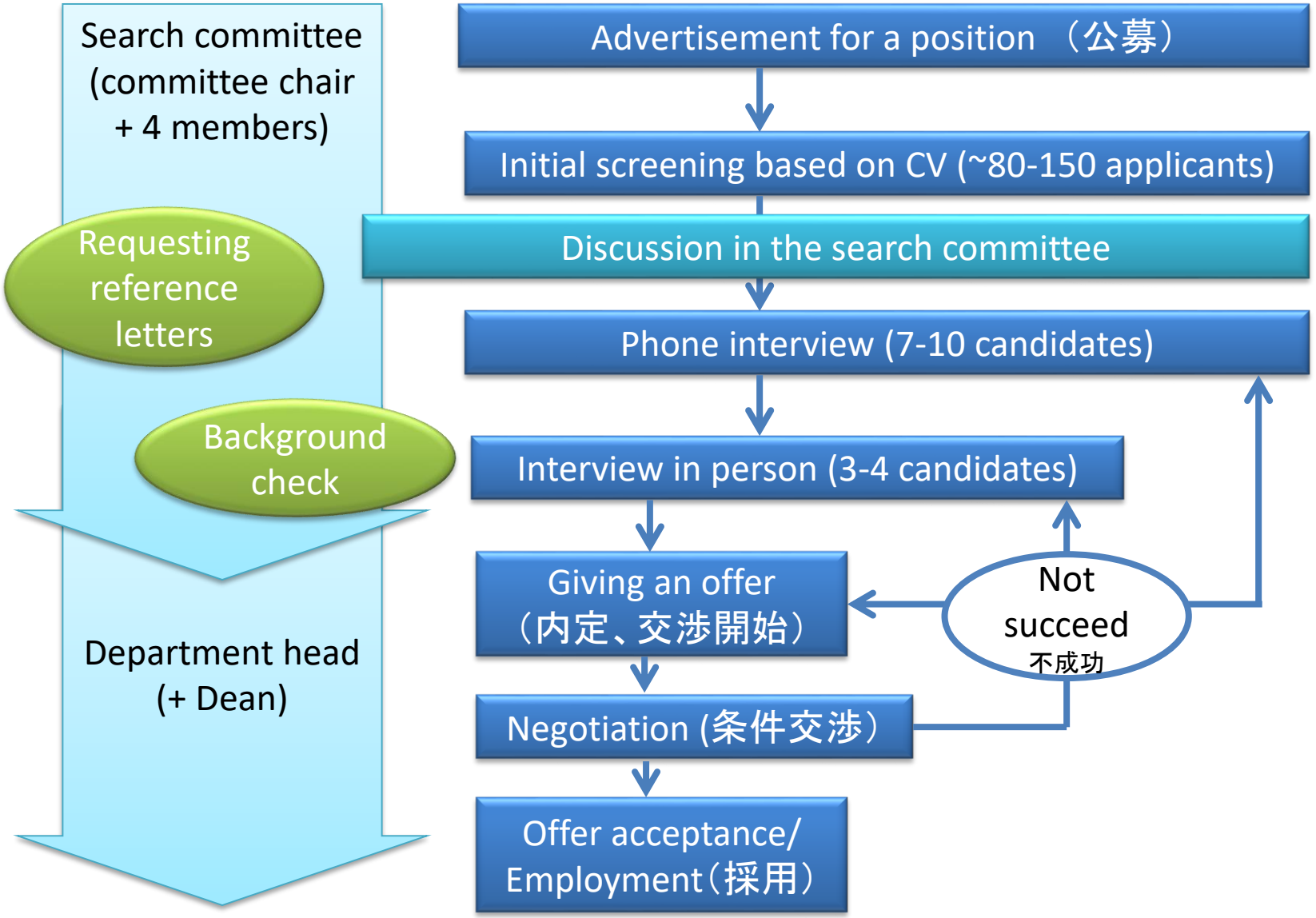
Website: www.abet.org

ABET Symposium

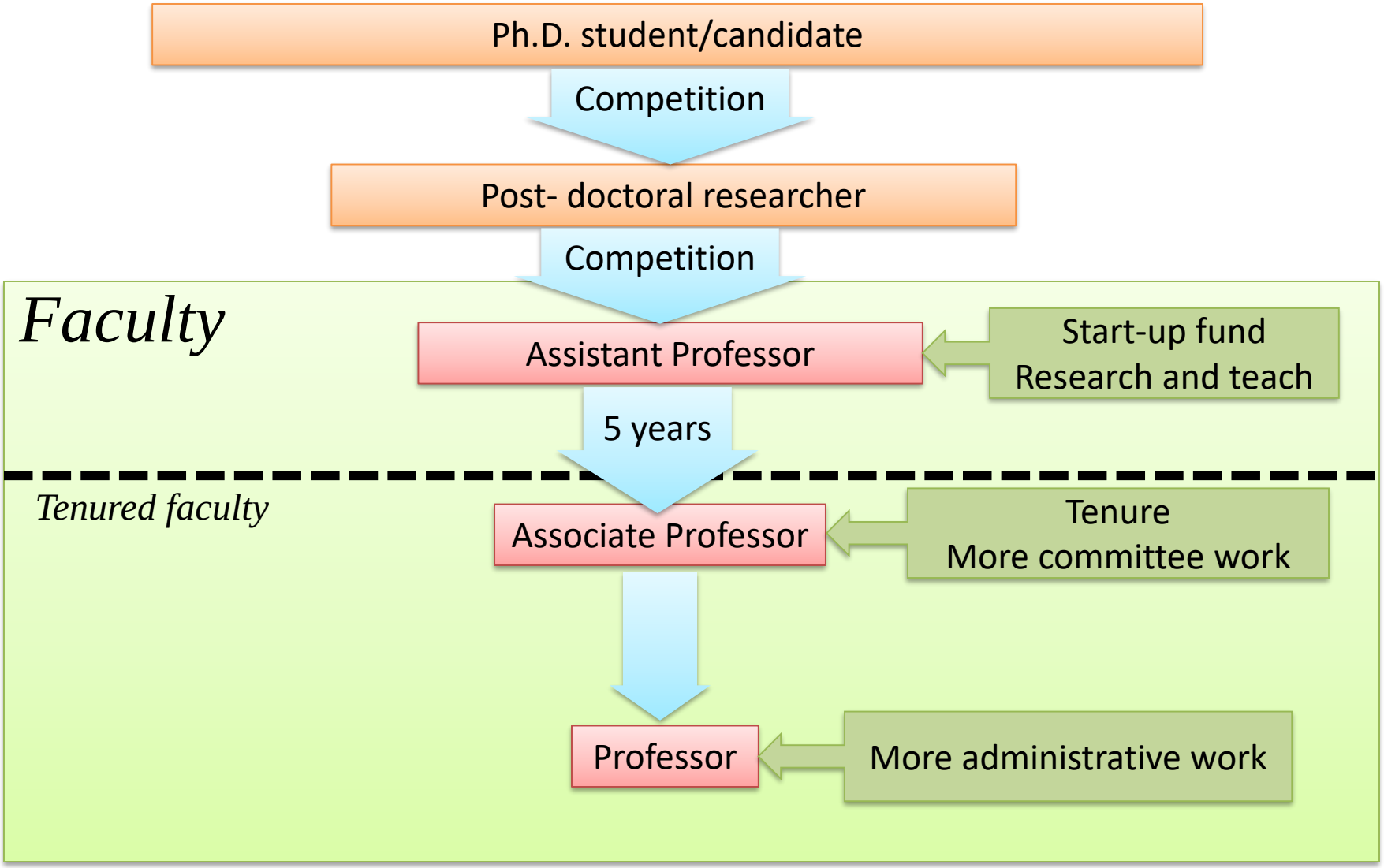
- April of each year
- Over 70 sessions
- Four educational tracks
  - Accreditation track
- Self-Study Reports

教員の採用システムと昇進制度

教員の採用システム


Search committee (committee chair + 4 members)
Requesting reference letters
Background check
Department head (+ Dean)
Advertisement for a position （公募）
Initial screening based on CV (~80-150 applicants)
Discussion in the search committee
Phone interview (7-10 candidates)
Interview in person (3-4 candidates)
Giving an offer （内定、交渉開始）
Not succeed 不成功
Negotiation (条件交渉）
Offer acceptance/ Employment（採用）

昇進制度


Ph.D. student/candidate
Competition
Post- doctoral researcher
Competition
Faculty
Assistant Professor
Start-up fund
Research and teach
5 years
Tenured faculty
Associate Professor
Tenure
More committee work
Professor
More administrative work

PACKET I

_____**DEPARTMENT EXPECTATIONS**
_____**HISTORY SHEET**
_____**JOB DESCRIPTION** (with all signatures)

_____**EVALUATION FORM AND COMMENTS**
- _____Ratings by department head
- _____Ratings by dean
- _____Recommendation by department head (written after departmental vote)
- _____Recommendation by dean (written after T&P committee's vote)
- _____Signature of candidate after department head's recommendation
- _____Signature of candidate after dean's recommendation

_____**COLLEGE TENURE AND PROMOTION COMMITTEE RECOMMENDATIONS**
- _____Vote tally
- _____Reasons (typed and sorted by positive and negative votes)

_____**DEPARTMENT RECOMMENDATIONS**
- _____Vote (indicating rank and tenure status of voters)
- _____Reasons (typed and sorted by positive and negative votes)
- _____Letter from candidate clarifying who can vote

_____**CANDIDATE'S RESPONSE TO COMMENTS** (optional)

_____**RESULTS FROM PREVIOUS DECISIONS** (organized by year)
- _____Evaluation forms
- _____Department head's comments
- _____Dean's comments
- _____Department votes and comments
- _____College tenure and promotion committee votes and comments
- _____University tenure and promotion committee votes and comments, if applicable

_____**SUPPORTING DOCUMENTS** (complete vitae including all of the following)

- _____Publications (clearly indicating publication status and whether refereed)
- _____Creative work (clearly indicating whether juried)
- _____Grants, presentations, professional service
- _____Honors and awards

_____**LIST OF ALL COURSES TAUGHT AT THE UNIVERSITY** (including credits)

_____Acknowledgement or Evaluation of Outreach Efforts (see http://www.uwyo.edu/acadaffairs/promotion/, click on: Assessment of Outreach Efforts)

_____**SUMMARY OF STUDENT EVALUATIONS** (in accordance with UniReg 5-800)

- _____Deans may request raw data in accordance with UniReg 5-800.3.g.
- _____Please include raw data in any contested or early case.

_____**OTHER INFORMATION** (optional)

- _____Unsolicited reviews
- _____Unsolicited letters of recommendation or recognition
- _____Solicited letters from students

_____**EXTERNAL LETTERS** (see UniReg 5-803)

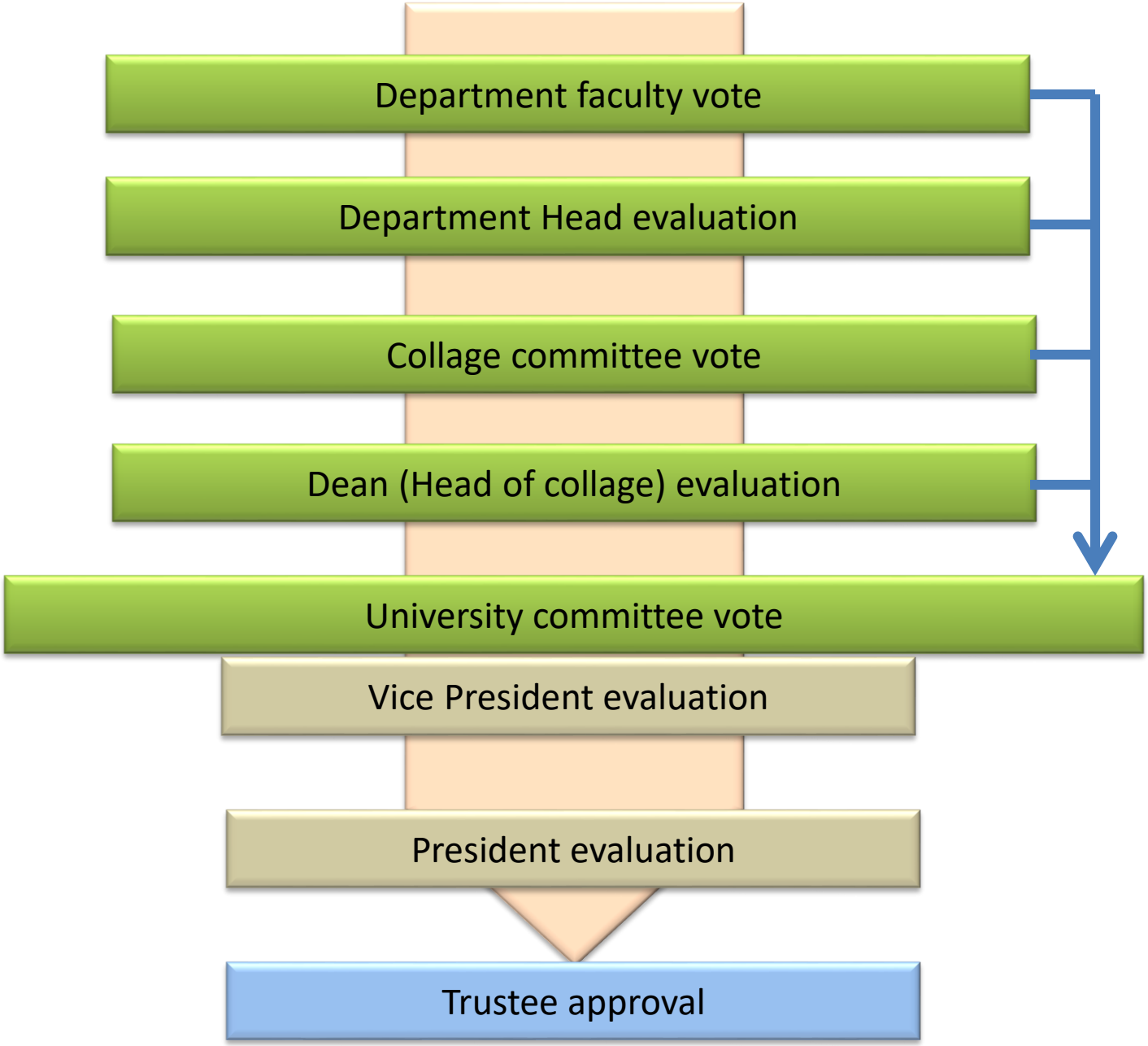
- _____Candidate's letter waiving right to see the external letters
- _____Summary of process used to solicit letters, including letter of solicitation
- _____Summary of qualifications of people writing the letters

PACKET II

This packet should contain one copy of each of the faculty member's **publications**. Where this is impractical because of volume, please indicate how they can be accessed. Please include off-prints (reprints) of any journal articles. Photocopies of published material are acceptable. Please **do not include unpublished manuscripts** unless they are accepted for publication. Also include photocopies of all funded grant proposals. Books, laboratory manuals, and classroom teaching materials should be submitted.

PACKET III

This packet should contain any additional information that the faculty member wishes to submit. Examples include such items as teacher ratings other than those requested in Packet I or more than three years old, course outlines, community service activities not related to the University position, non-funded research proposals, and so forth. Candidates should exercise judgment and include only materials that are appropriate to the decisions that their colleagues must make.


Department faculty vote
Department Head evaluation
Collage committee vote
Dean (Head of collage) evaluation
University committee vote
Vice President evaluation
President evaluation
Trustee approval

UW Salary Comparisons to OSU by Rank (2009-2010 data)

Rank	Number of Faculty	Number of Departments	Average Salary (Average of Department Averages)	OSU Average Salary across UW Disciplines	UW% of Market Average*
Professors	213	53	$104,290	$114,021	91% (91%)
Associate Professors	196	56	$75,980	$81,103	96% (94%)
Assistant Professors	172	53	$66,734	$69,293	98% (96%)
Total	581	60			

UW Salaries Relative to Market by College

College	Average % of Market	Minimum % of Market (rank, number)	Maximum % of Market (rank, number)
Education	100%	84% (assoc, 26)	116% (asst, 15)
Arts & Sciences	97%	92% (full, 94)	101% (asst, 77)
Engineering	95%	92% (full, 31)	99% (asst, 18)
Agriculture	92%	90% (assoc, 25)	97% (asst, 26)
Health Sciences	91%	84% (full,11)	95% (asst, 14)
Business	85%	78% (asst, 20)	93% (full, 16)
Law	82%	80% (full, 11)	91% (asst, 2)
UW Weighted Average*	93%	91%	96%

UC Davis

Rank	Step	Normal Years at Step	Minimum Scale 7/1/18 Annual	Minimum Scale 7/1/18 Monthly	Adjusted Scale 7/1/18 Annual	Adjusted Scale 7/1/18 Monthly	Annual Step Plus Increment†	Monthly Step Plus Increment†
Assistant Professor	1	2 years	$60,600	$5,050.00	$62,700	$5,225.00		
	2		$64,400	$5,366.67	$66,600	$5,550.00		
	2.5				$68,400	$5,700.00	*$1,800*	*$150.00*
	3		$67,800	$5,650.00	$70,200	$5,850.00		
	3.5				$72,200	$6,016.67	*$2,000*	*$166.67*
	4		$71,900	$5,991.67	$74,200	$6,183.33		
	4.5				$76,100	$6,341.67	*$1,900*	*$158.33*
	5		$75,200	$6,266.67	$78,000	$6,500.00		
	5.5				$80,100	$6,675.00	*$2,100*	*$175.00*
	6		$79,000	$6,583.33	$82,100	$6,841.67		
	6.5				$84,300	$7,025.00	*$2,200*	*$183.33*
Associate Professor	1	2 years	$75,300	$6,275.00	$78,100	$6,508.33		
	1.5				$80,200	$6,683.33	*$2,100*	*$175.00*
	2		$79,100	$6,591.67	$82,200	$6,850.00		
	2.5				$84,400	$7,033.33	*$2,200*	*$183.33*
	3		$83,500	$6,958.33	$86,400	$7,200.00		
	3.5				$89,000	$7,416.67	*$2,600*	*$216.67*
	4	3 years	$88,700	$7,391.67	$91,600	$7,633.33		
	4.5				$95,200	$7,933.33	*$3,600*	*$300.00*
	5		$95,600	$7,966.67	$98,700	$8,225.00		
	5.5				$102,500	$8,541.67	*$3,800*	*$316.67*
Professor	1	3 years	$88,800	$7,400.00	$91,700	$7,641.67		
	1.5				$95,300	$7,941.67	*$3,600*	*$300.00*
	2		$95,700	$7,975.00	$98,800	$8,233.33		
	2.5				$102,600	$8,550.00	*$3,800*	*$316.67*
	3		$102,600	$8,550.00	$106,300	$8,858.33		
	3.5				$110,200	$9,183.33	*$3,900*	*$325.00*
	4		$109,900	$9,158.33	$114,100	$9,508.33		
	4.5				$118,300	$9,858.33	*$4,200*	*$350.00*
	5		$117,900	$9,825.00	$122,500	$10,208.33		
	5.5				$127,300	$10,608.33	*$4,800*	*$400.00*
	6		$127,600	$10,633.33	$132,100	$11,008.33		
	6.5				$137,300	$11,441.67	*$5,200*	*$433.33*
	7		$138,100	$11,508.33	$142,500	$11,875.00		
	7.5				$148,300	$12,358.33	*$5,800*	*$483.33*
	8		$149,600	$12,466.67	$154,100	$12,841.67		
	8.5				$160,700	$13,391.67	*$6,600*	*$550.00*
	9	4 years	$162,000	$13,500.00	$167,200	$13,933.33		
	9.5				$174,300	$14,525.00	*$7,100*	*$591.67*
	AS±				$181,412	$15,117.67		

工学教育の近年のトレンドと新しい試み

工学教育の近年のトレンドと新しい試み

- VISTA program
- Construction management program (New degree)
- PhD Pathway to Licensure (PE)

VISTA

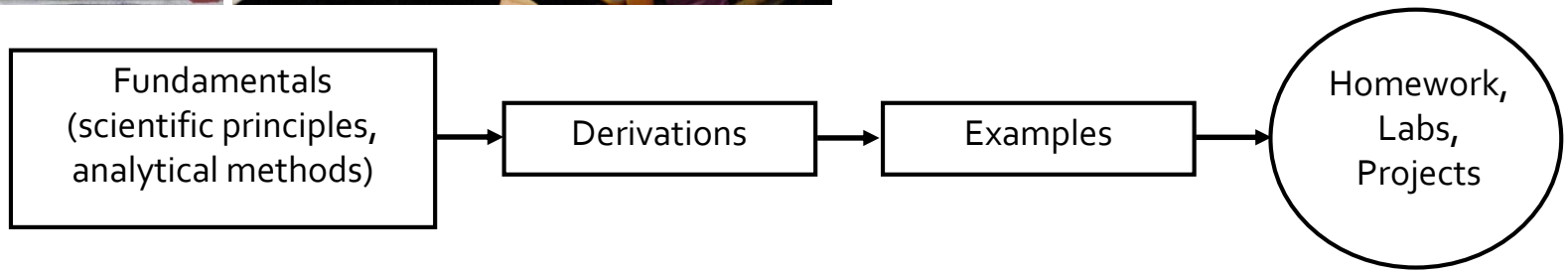
Vertically Integrated Science, Technology and Application

1. Four years of Design
2. Inductive (Hands-On) Learning
3. Real-world problems
4. Students work in teams
5. Engagement with industry
6. Professional Skills

発注受注プロセス
工学法規
工学倫理
建設マネージメント
経済学、コスト計算、会計
CAD、口頭発表、報告書作成

12th-century — 20th-century

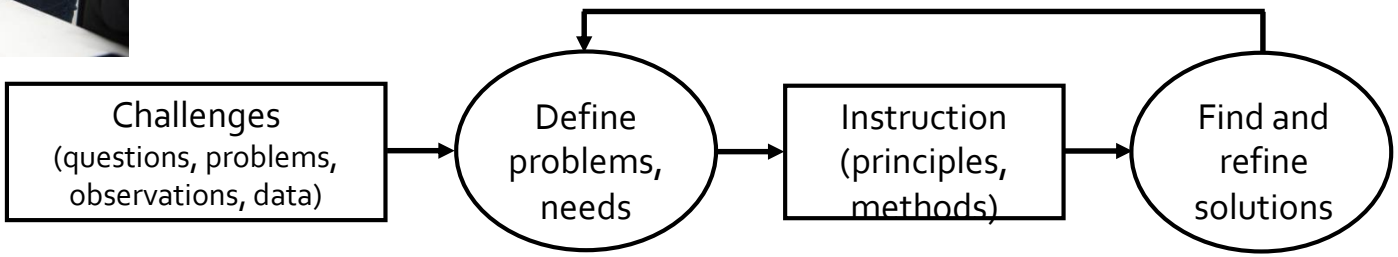
THEORY first, DESIGN second



21st-century

THEORY and DESIGN hand-in-hand

VISTA



VISTA

FRESHMAN YEAR: FALL

CHEM	1020	General Chemistry	4
ENGL	1010	English Composition	3
CE	1000	VISTA Studio I	2
		Freshman Seminar	3
MATH	2200	Calculus I	4
			16

FRESHMAN YEAR: SPRING

CE	1010	Civil Engineering Tools	3
COJO	2010	Public Speaking	3
ES	2110	Statics	3
MATH	2205	Calculus II	4
		US & Wyo Constitutions	3
			16

SOPHOMORE YEAR: FALL

CE	2000	VISTA Studio II	3
CE	2070	Engineering Surveying	3
ES	2120	Dynamics	3
ES	2410	Mechanics of Materials	3
MATH	2210	Calculus III	4
			16

SOPHOMORE YEAR: SPRING

ES	2310	Thermodynamics	3
ES	2330	Fluid Dynamics	3
MATH	2310	Applied Differential Eqns.	3
PHYS	1220	Engineering Physics II	4
STAT	2050	Fundamentals of Statistics	4
			17

JUNIOR YEAR: FALL

CE	3000	VISTA Studio III	3
CE	3200	Structural Analysis I	3
CE	3210	Civil Engineering Materials	3
CE	3300	Hydraulic Engineering	3
		Science Elective	3
		Human Cultures	3
			18

JUNIOR YEAR: SPRING

CE	3010	Civil Engineering Design	3
CE	3400	Intro to Environmental Engineering	3
CE	3500	Transportation Engineering	3
CE	3600	Soil Mechanics	3
		Human Cultures	3
			15

SENIOR YEAR: FALL

CE	40x0	Studio IV	4
		Structural Design	3
		Civil Engineering Elective	3
		Civil Engineering Elective	3
		Technical Elective	3
			16

SENIOR YEAR: SPRING

		Civil Engineering Elective	3
		Civil Engineering Elective	3
		Science Elective	3
		Technical Elective	3
		Technical Elective	3
			15

Total Hours: 129

Construction Management program (New degree)

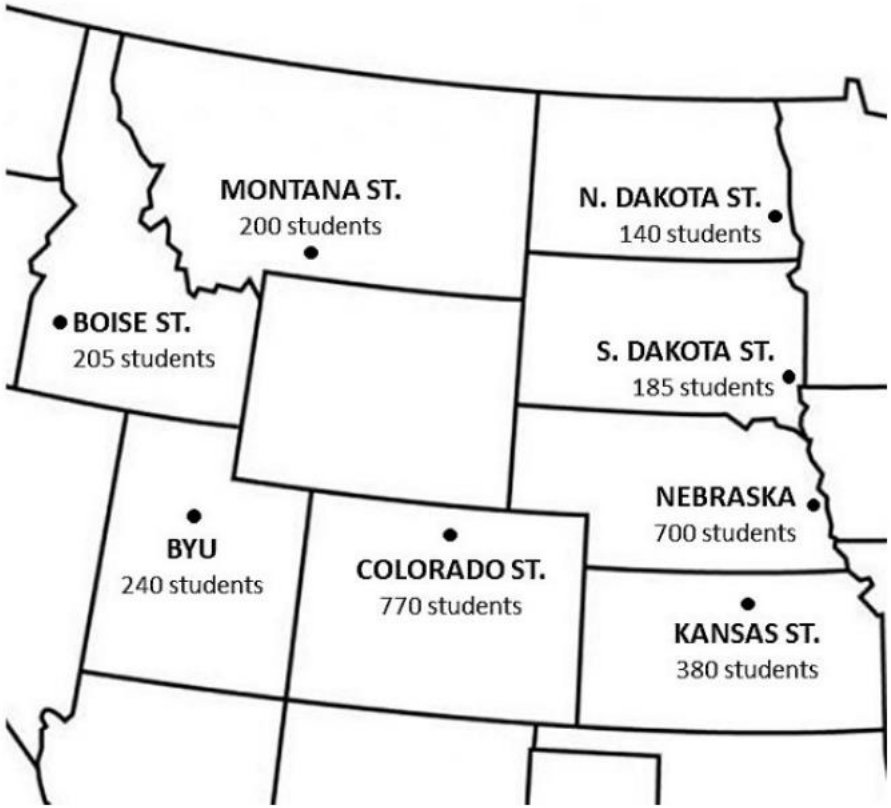
- Expected 4-year enrollment: 150 or more
- Can offer in Academic Year 2018-19
- Not an engineering degree
- Accreditation by American Council for Construction Education (ACCE)
- Curriculum takes advantage of some existing courses in Engineering and Business
- Need 13 new courses in Construction Management
- Need 5 faculty and 1 administrative assistant

Demand for Construction Management professionals

The demand for Construction Management professionals is strong and forecasted to grow:

- Employment of construction managers is expected to increase 16% from 2012-22. About 20,000 new jobs will be created nationwide.
- Salaries for construction managers in 2015 ranged from $90,410 (heavy and civil construction firms) to $78,010 (residential).

Right: Student demand for construction programs in neighboring states.



Proposed curriculum for CM

FALL **FR** *16 credits*	CE 1000: VISTA I	1
	MATH 1450: Algebra and Trig.	5
	USP C1 requirement	3
	USP FYS requirement	3
	Science Elective	4

SPRING **FR** *17 credits*	ARE 1600: Arch. Design Studio I	3
	MATH 2200: Calculus I	4
	PHYS 1110: General Physics I	4
	USP C2 requirement	3
	USP V requirement	3

FALL **SO** *16 credits*	ACCT 1010: Accounting I	3
	CM 2100: Intro to Const. Mgmt.	3
	CM 2120: Const. Materials & Methods	3
	STAT 2050: Fund. of Statistics	4
	USP H requirement	3

SPRING **SO** *15 credits*	ACCT 1020: Accounting II	3
	ARE 2600: Arch. Design Studio II	3
	CM 2200: Structures	3
	CM 2400: MEP Systems	3
	MGT 1040: Legal Environ. of Business	3

FALL **JR** *15 credits*	CE 2000: VISTA II	3
	CE 2070: Engineering Surveying	3
	CM 3100: Const. Scheduling	3
	CM 3220: Soils and Concrete	3
	USP H requirement	3

SPRING **JR** *15 credits*	CM 3120: Const. Estimating	3
	CM 3140: Heavy Construction	3
	CM 3160: Const. Law & Contracts	3
	MGT 3110: Business Ethics	3
	USP C2 requirement	3

FALL **SR** *15 credits*	CE 3000: VISTA III	3
	CM 4100: Project Management	3
	CM 4120: Construction Safety	3
	MGT 3210: Mgmt. and Organization	3
	CM Elective (summer internship)	3

SPRING **SR** *12 credits*	CM 4600: Bldg. Information Modeling	3
	CM 4900: Capstone Design Project	3
	CM Elective	3
	CM Elective	3

PHD PATHWAY TO LICENSURE

WWW.WYO.GOV/WYBPEPLS

RULES PG 3-4,3-5

PHD Licensure

Board Rules, Ch 3

- Professional Engineer Licensure for Applicants with a Doctoral Degree
  - A "doctoral curriculum approved by the Board" is defined as an earned doctoral degree in engineering from a an institution that grants ABET accredited undergraduate or graduate degrees.
  - "Examinations required by Rule of the Board" are defined as
    - A written examination on professional ethics and Wyoming licensing laws related to engineering and surveying, and
    - An oral interview with the Board.
  - The four years of engineering experience must be obtained after the applicant completes his/her first degree in engineering. No credit will be given for applicants graduate education.
  - The applicant will be exempt from both the FE and PE exams.

From PHD PATHWAY TO LICENSURE
Shelley Macy, P.E.

PhD Pathway to Licensure

- Wyoming is the first state accepting the PhD application for PE.
- Only for Ph.D. holders graduated from American institutions (ABET accredited).
- This will provide graduate students and researchers for PE training opportunities.
- Additional revenue for the state

Summary – PhD pathway to PE

- Application
- Good moral character – recommendations
- PhD earned from ABET accredited institution for undergraduate or graduate engineering degrees
- Must pass our written ethics and Wyoming specific
- licensing law examination
- Must participate in Oral Interview with Board

Thank you