A. **TITLE:** Advanced Science and Technology of Behavior I

B. **COURSE NUMBER:** ABAP 385

C. **CREDIT HOURS:** 3

D. **WRITING INTENSIVE COURSE:** No

E. **COURSE LENGTH:** 15 weeks

F. **SEMESTER(S) OFFERED:** Fall or Spring

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
   3 lecture hours per week

H. **CATALOG DESCRIPTION:**

   This first course of a two course sequence covers in detail the basic variables of which the behavior of humans and other animals is a function, as discovered from the natural science perspective and with the emphasis on increasingly complex human behavior. Included is not only the wide range of pertinent and accessible environment–behavior functional relations, but also the naturalistic philosophical foundations of the behaviorology (science and technology of behavior) discipline as well as the research methodology involved in discovering the independent variables in these relations and engineering them into sophisticated applications and interventions beneficial to humanity. Course topics include (a) classifying behavior, (b) avoiding explanatory fictions and analytical fallacies, (c) experimentally manipulating independent variables of behavior, (d) measuring, recording, graphing, and interpreting behavior–related data, and (e) turning the experimentation–based prediction and control of behavior into beneficial behavior engineering practices emphasizing postcedent processes.

I. **PRE-REQUISITES/CO-REQUISITES:**
   a. Pre-requisite(s): Introduction to the Science and Technology of Behavior (ABAP 245) and 60 credit hours, or permission of instructor.

   b. Co-requisite(s): none

J. **GOALS (STUDENT LEARNING OUTCOMES):**
   By the end of this course, the student will be able to:

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Institutional SLO</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Describe and explain the main characteristics of the naturalistic philosophical foundations of natural sciences in general and the natural science of behavior (behaviorology) in particular, comparing the humane outcomes these foundations promote with the outcomes promoted by non–natural alternatives</td>
<td>2. Crit. Thinking</td>
</tr>
<tr>
<td></td>
<td>3. Prof. Competence</td>
</tr>
<tr>
<td>b. Explain and differentiate between valid scientific analyses and both (a) explanatory fictions or (b) analytical fallacies, specifying and</td>
<td>1. Communication</td>
</tr>
<tr>
<td></td>
<td>2. Crit. Thinking</td>
</tr>
<tr>
<td></td>
<td>3. Prof. Competence</td>
</tr>
</tbody>
</table>
explaining the problems and dangers inherent in explanatory fictions and analytical fallacies

e. Analyze behaviors in order to classify the different types, enumerating different classification systems and the differences that lead to different classifications in those systems

d. Analyze situations and, based on that analysis, determine the appropriate experimental methodology for studying and changing the contingencies in those situations, including methods for generating, recording, graphing, and interpreting behavior–related data

2. Crit. Thinking
3. Prof. Competence
4. Inter-Intrapersonal Skills

K. TEXTS:

• Half of the chapters in General Behaviorology – The Natural Science of Human Behavior by Dr. Lawrence Fraley
and
Study Questions for Fraley’s General Behaviorology by Dr. James O’Heare
OR
• Half of the chapters in Applied Behavior Analysis – Second Edition by Drs. Cooper, Heron, and Heward
• Supplemented by other books and articles as appropriate.
(See the references.)

L. REFERENCES:

M. **EQUIPMENT:** Smart classroom.

N. **GRADING METHOD:** A-F

O. **MEASUREMENT CRITERIA/METHODS:** To be determined by the instructor.

Possibilities include but are not limited to:
- assigned homework completion
- research papers
- book reports
- group oral/written reports
- individual oral/written reports
- essays
- class participation
- projects
- journals
- quizzes
- tests
- exams

P. **DETAILED COURSE OUTLINE:**

I. Natural scientists and their community.
   A. Natural science organization.
      1. Basic versus applied.
      2. Reduction principle.
      3. Sociocultural importance.
   B. Natural science assumptions.
      1. Naturalism.
         a. Philosophy of science.
         b. Induction from objective evidence accumulation.
      2. Naturalism versus mysticism/superstition.
         b. Disconnection between principles and practices.
   C. Variables in the natural sciences.
   D. The natural science of human behavior (behaviorology).
      1. Definition of behaviorology.
      2. Emergence, nature, and capacity of behaviorology.
         a. Behaviorology as a discipline.
         b. Relation to other disciplines.
         c. Relation to other fields.

II. Kinds of behavior.
   A. Definitions of behavior.
   B. Perspectives on behavior.
   C. Traditional classifications of behavior.
      1. Motor behavior.
      2. Verbal behavior.
      3. Emotional behavior.
   D. Behaviorological classifications of behavior.
1. Respondent behavior.
2. Operant behavior.

E. Properties of behavior.
   1. Environment.
   2. The energy to behave.
   3. Other non–behaviors.
   5. Different ways to account for behavior.

F. Avoiding private internal events during analyses.

G. Traits are not behaviors.
   1. The relation of traits to behaviors.
   2. Ambiguous references.

III. Functional relations in the natural science of behavior.
    A. Definition of “functional relation”.
       1. The nature of environment–behavior functional relations.
       2. Practical examples of behaviorological functional relations.
       3. Terms and phrases.
       4. All behavior is controlled.
    B. The analysis of behavioral events.
       1. General analytical approach.
       2. Antecedent events.
       3. Postcedent events.
       4. Terms of function.
       5. The question of immediacy..
       6. Answering basic analytical questions.
    C. Common explanatory alternatives.
       1. Avoiding difficult analyses.
       2. Time as cause.
       3. Genes as cause.
       4. The necessary elicitation of respondent behavior.
       5. The bodily support of behavior.
       6. Biological versus behaviorological control of behavior.
       7. Distinguishing between “evoke” and “elicit”.

IV. Explanatory fictions.
    A. The point of being scientific.
       1. Practical behaviorological technologies.
       2. The hypothetical fictional construct.
       3. Explanatory fictions versus untrue explanations.
       5. Teleological explanations.
    B. Explanatory fictions in respondent conditioning.
    C. Explanatory fictions in operant conditioning.
    D. Relations among kinds of behavior.
    E. Levels of analysis in explanations of behavior.
    F. The role of emotional predispositions.
    G. Departures from the analytical level of functional antecedent stimuli.
    H. Ambiguous terms.
       1. Like.
2. Want.
3. Desire.

I. Transparency of fictional explanations.

V. Behavior in its natural context.
A. Contingencies of survival.
   1. Selection under contingencies of survival.
   2. Contingencies of survival versus contingencies of reinforcement.
B. Contingencies of reinforcement.
   1. Selection under contingencies of reinforcement.
   2. Properties and analysis.
   3. Two–term contingencies.
   4. Symbolic notation for complex antecedents.
   5. Three–term contingencies.
   6. The locus of the operant effect.
   7. Identifying the behavior of concern.
   8. Chained effects of operant conditioning.
   10. Problems with the technical language.
   11. The maintenance of behavior.
   12. The basis of behavior technology.
   13. Invalid assumptions that impede behavior technology.
C. Miscrafting science to accommodate bias.
   1. Myths of uncaused behavior.
   2. Dispelling the free agent.
D. Unnecessary awareness of contingencies controlling behavior.
E. Language as the product of operant selection.
F. Causal fallacies in the analysis of concurrent behaviors.
   1. Concurrent responses to a single antecedent stimulus.
   2. Practical functions of emotional arousal.
G. Different kinds of “contingencies of reinforcement”.
   1. Reinforcement in general.
   2. Positive reinforcement.
   3. Negative reinforcement.
   4. Positive punishment.
   5. Negative punishment.
   7. Confusions among kinds of contingencies.
      a. Writing contingencies.
      b. Locating the consequences.
H. Further consideration of the consequences of operant behavior.
   2. Exclusively operant functions.
   3. The basis of behavior technology.
   4. A third possibility for changing a behavior.
   5. Important analytical considerations.
I. Writing contingencies in symbolic notation.

VI. Concurrent contingencies.
A. The analysis of multiple contingencies.
B. Multiple contingencies on one behavior.
   1. “Progress” as a Conditioned Reinforcer.
   2. Conflict.
C. Private versus public events in analyses.
   1. Rendering the analytical scheme practical.
   2. The functioning of verbal behavior.
D. Speculation in contingency analyses featuring private events.
E. The postulate of behavior passivity.

VII. Analytical fallacies.
A. Time is not behavior.
B. Avoid writing contingencies for behaviors that do not occur.
C. The behaviorological analysis of “boredom”.
   1. Boredom featuring positive reinforcement.
   2. The Role of Consciousness.
   3. Boredom featuring negative reinforcement.
D. The role of bodily states.
   1. Body states are not behaviors.
   2. Body states as stimuli.
E. Avoiding remote antecedents and postcedents.
F. Specific response, or behavior in general?
G. Metacontingencies.
   1. Distinguishing between metacontingencies and contingencies of reinforcement.
   2. Metacontingencies that yield nonbehavioral outcomes.
   3. Metacontingencies that yield behavioral outcomes.

VIII. The measurement of behavior.
A. Distinguishing between measures of behavior and measures of outcomes of behavior.
   1. Outcome–based measures.
      b. Measures based on properties of behavior.
   3. Describing behavioral events in terms of both behaviors and their effects.
B. To measure and not to measure.
   1. The nature of measurement–produced stimuli.
   2. Life without measurement.
C. Subjective opinions versus direct measures.
D. Dimensions of muscular behavior.
   1. Measurable properties of muscular behavior.
      a. Independently measurable dimensions of behavior.
      b. Multiple latencies within interresponse times.
   2. Detecting subtle changes in behavior.
E. Measured versus computed properties of behavior.
   1. Contrast between measured and computed properties of behavior.
   2. Defining the Behavior of Concern.
   3. Count.
   4. Rate.
5. Celeration.
   a. Common agential language.
   b. Variable celeration.

F. The importance of rate in behaviorology.

G. Testing and measuring.

H. Criterion–and–norm–referenced testing in psychology and in behaviorology.
   1. Reviewing relevant contrasts between the disciplines.
   2. The implications of philosophical differences for practices of measurements.

I. Predicting a person’s performance.

J. Dimensional analysis.
   1. Converting units of measure using dimensional analysis.
   2. Practice using dimensional analysis.

K. Practical issues pertinent to counts and rates.
   1. Precisely defining and identifying the target behavior.
   2. Establishing separate behavior–change projects for each behavior.
   3. Selecting an accessible and measurable behavior.
   4. Establishing appropriate units of measure.
   5. Establishing an appropriate pace for steps in a behavior change project.
   6. What to count: the behavior, its supportive materials, or its products?
   7. Under what circumstances is time counted?

L. Measurement in the practical work of a behaviorologist.
   1. A typical behavioral problem assigned to a behaviorologist.
   2. Seven stages of analyzing and solving problems.
   3. Analytical steps that precede intervention.

IX. Behavior change projects.

A. The baseline phase.
   1. The length of baselines.
      a. Level.
      b. Trend.
         c. Variance or “bounce”.
   2. Drawing vertical lines.

B. The intervention phase.
   1. Subdivisions of the intervention phase.
   2. The width of the zone.

C. The maintenance phase.

D. Interpreting plotted data.

E. The controlled gradual change of behavior.
   1. Design for a controlled gradual behavior change.
   2. Data plotting for a gradual behavior change.

F. The incremental stability design.

G. The general strategy for designing a typical project.
   1. Planning a behavior change project.
   2. Form for a behavior change project managed by the person whose behavior is to change.
      a. Form items discussion.
         i. What is the problem?
ii. Precisely specify the target behavior.
iii. Resolve other ambiguous issues.
iv. Specify the collateral variables.
v. Pilot studies.
b. Non–behavioral primary goals.
3. More complicated experimental designs possible.

X. Graphs and graphic technique.
A. Why plot data on graphs?
B. Data graphed for comparison with tabled data.
C. What graphs show.
   1. Interpreting a plotted data point.
   2. Beginner’s data plotting mistakes.
   3. The assignment of axes.
D. Some common forms of graphs.
   1. Equal interval line graphs.
      a. Line graphs featuring a curve of best fit.
      b. Line graph variations.
      c. Zone of best fit.
      d. Missing data points.
      e. Connecting the data points.
      f. Connect only those points representing measured values.
      g. Omitting connector lines where a data point is missing.
      h. Lines or curves of best fit.
      i. Cumulatively plotted graphs.
      j. A comparison of non–cumulative and cumulative graphs of the same data.
   2. Equal ratio line graphs.
      a. Comparison of an equal interval graph with an equal ratio graph both of which show the same plotted data.
      b. Daily behavior chart.
      c. Same equal ratio gains plotted on equal interval and equal ratio grids.
      a. Bar graphs versus line graphs.
      b. Bars with added features.
         i. Bar graphs in which each bar reflects additional data distributions.
         ii. Simple visual enhancements for bar graphs.
         iii. Different bar graphs that present the same data in different graphic forms.
      c. Bar orientation.
E. Drawing graphs.
   1. Labeling the parts of a graph presenting behavior–related data.
   2. Labeled parts.
      a. The title of the graph.
      b. The axis graduation marks or grid markers.
      c. The numerical units of graduation along the axes.
      d. Axis labels.
   3. Preserving the data points.
   4. Protecting the data points from obliteration.
5. Variations in line thickness.
6. Coloring.
7. Choice of scales.
   a. Appropriate and balanced scales.
   b. Compressed horizontal scale.
   c. Compressed vertical scale.
F. Coordinated graphs.
   1. Two coordinated graphs that reveal opposite trending.
   2. Two coordinated graphs that reveal a delayed relation.
   3. More than two coordinated graphs.
G. Confidence in the value of a plotted data point.
H. Improvement in reliability with increased counting time.
I. Algebraically cumulative graphs.

XI. Graphing and interpreting behavior–related data.
A. Count, rate, and percent graphs.
   1. A suitable data table.
      a. Count, rate, and percent graphs based on the same set of behavior–related data.
      b. Complete vertical scale with a corresponding reduction in the apparent variance.
      c. Scale construction.
   2. Distinctions between count and rate graphs.
      b. Simple rate graphs.
      c. Common graphing mistakes.
      d. Different expressions of the same rate.
   3. When to plot rates instead of counts.
   4. When to use percent graphs or fraction graphs.
B. The meaning of the slope of a plotted cumulative curve.
   1. The slope on cumulative count graphs.
      a. The definition of the “slope” of a line.
      b. Determining the slope.
      c. Determining the rate from a non–linear cumulative count graph.
   2. The slope on cumulative rate graphs.
      a. The meaning of each time unit.
      b. Impractical celeration units.
   3. Intelligence: an application of the celeration concept.
   4. Celeration from a cumulative count graph.
      a. Determining celeration.
      b. Interpreting celeration.
C. Matching a graph to a question.

XII. Postcedent behavior change processes.
A. Contingencies of reinforcement.
   1. Important contingent relations in operant behavior change processes.
   2. Antecedent relations.
   3. Postcedent relations.
   4. Distinguishing between behavior and response.
   5. “Learning”.
B. Positive and negative reinforcement in detailed review.
C. Punishment.
   1. Reinforcement versus punishment.
   2. Comparing the effects of operant postcedent behavior change processes.
   3. The over–recovery of previously punished behavior.
   4. Misinterpreting complex situations.
D. Review of extinction.
   1. Process versus procedure.
   2. The characteristics of extinction.
   3. Punishment versus extinction.
   4. Extinction versus preclusion (prevention).
E. The fallacy of seemingly permanent effects of punishment.
   1. The reactions of a behavior to punishment.
   2. Writing descriptive contingencies in complex situations.
F. Conditioning and shaping an audience.
G. Comparing behavior rate–change processes.
H. Confirming and analyzing behavioral processes.
I. Specifying the terms in three–term contingencies.
   1. Where does the change in rate appear?
   2. How to indicate extinction.
J. Glossary of relevant technical terms and phrases.

XIII. Theoretical elaborations of analyses of postcedent behavior change processes.
A. Review of behavior change options.
   1. Antecedent interventions.
   2. Altering schedules of reinforcement.
   3. Changing the structure of the behaving body.
B. The Issue of behavioral stasis.
C. Detailed characteristics of postcedent interventions.
   1. The postcedent category.
   3. Intrinsic versus extrinsic reinforcers.
   4. Discovering effective reinforcers and aversers.
   5. Emotional effects as conditioned reinforcers.
   6. Undesirable behavior.
   7. The recurring issue of conscious-ness.
D. General considerations about postcedent interventions.
   1. Forgoing postcedent interventions in favor of an antecedent alterna-tive.
   2. Extinguishing undesired behavior.
   3. Extinction combined with reinforcement.
   4. Superstitious behavior.
E. Detailed technical review of reinforcement, punishment, and extinction.
   1. Identifying an ongoing behavior–changing process.
   2. Reinforcement defined.
   3. The process of reinforcement and its subsequent confirmation.
   4. Analytical questions to identify the reinforcement process.
   5. A special conditioned consequence in delayed reinforcement.
   6. Punishment defined.
   7. The process of punishment and its subsequent confirmation.
   8. Analytical questions to identify the punishment process.
F. Discriminating functional and temporal relations.
G. Natural and contrived contingencies of reinforcement and punishment.
H. The maintenance of a behavioral suppression beyond the duration of positive punishment.
I. Extinction.
   1. Practical difficulties.
   2. Defining the extinction process.
   3. Issues when defining extinction.
   4. The behavioral effects of extinction–like processes.
   5. Different levels of analysis for in-quiries into extinction–like pro cesses.
   6. Extinction applied to behavior maintained by reinforcers.
      a. Abrupt elimination of the reinforcer.
      b. Gradual elimination of the reinforcer.
      c. The length of an extinction curve.
   7. Natural and contrived extinction.
   8. Extinction–like procedure applied to behavior maintained by punishers.
   9. Recovery of previously punished behavior under an extinction–like procedure.
   11. Extinction, intensification, and recovery events within the reequilibration metaprocess.
   12. Symbolic notation for extinction.
      a. Extinction versus preclusion.
      b. Postcedent process.
      c. Denoting extinction.
      d. Indicating the loss of antecedent function.
   13. Accounting for extinction.
      a. Traditional though fallacious accounts.
      b. Why the behavior stops.
      c. Verbal supplements.
      d. The categorization of extinction.
      e. Determinism.
   15. Response cost.
   16. Extinction with negative reinforcement.
   17. Physiological versus behaviorological perspectives.
   18. Analyzing familiar situations that feature extinction.
J. Depression as products of punishment versus extinction.
K. The non–behavior fallacy.
L. Introduction to shaping.
   1. Review of simple operant conditioning.
   2. Shaping versus reinforcement.

Q. LABORATORY OUTLINE: No laboratory