

北陸先端科学技術大学院大学研究室教育指針
Laboratory Education Guideline

研究室教育指針は、学則第30条の3に基づき、研究指導の方法及び内容並びに修了までの研究指導の計画をあらかじめ明示するものです。

Based on the Article 30-3 of the general academic rules, the Laboratory Education Guideline is intended to clearly outline the methods and content of research guidance, as well as the plan for research guidance until completion.

氏名 / name : TANIIKE Toshiaki 役職 / official position : Professor

1. 研究テーマ / Research Theme
Exploratory Data-Driven Materials Discovery To address pressing global challenges such as climate change and societal transformation, materials chemistry must achieve unprecedented levels of innovation. This requires exploratory research that goes beyond existing knowledge and discovers previously unrecognized value within the vast and largely unknown “materials universe.” The Taniike Laboratory conducts exploratory materials research aimed at efficiently and systematically discovering new materials and functionalities, including catalysts, polymers, and nanomaterials. By integrating high-throughput experimentation capable of generating large-scale, high-quality datasets, machine-learning techniques that generate hypotheses directly from data, and computational chemistry for predicting material structures and properties, we establish a research framework that liberates researchers from repetitive tasks. This enables researchers to devote their efforts to creativity, insight, and truly innovative thinking.
2. 修得が期待される能力 / Competencies expected to be acquired 研究室教育は必修 A 科目（先端）又は研究支援科目（融合）の一部として単位化されており、この欄はそれら科目のシラバス上の達成目標の一部となります。 Laboratory Education is accredited as a part of the Required courses A (Division of Advanced Science and Technology) or Research Support Courses (Division of Transdisciplinary Sciences), and this section constitutes a part of the course goals stated in the syllabus for such subjects. Students are expected to progressively acquire the following competencies through their research activities.
<input type="checkbox"/> Expert Knowledge and Technical Skills • Fundamental knowledge of materials synthesis, characterization, and evaluation, as well as catalysis and reaction engineering, and the ability to apply this knowledge to research. • Practical skills in materials research using programming, data analysis, and machine learning. • The ability to systematically advance research by integrating experimentation, computation, and data-driven approaches (doctoral program only).
<input type="checkbox"/> Research Capabilities • The ability to design research plans and conduct research efficiently under given conditions and resource constraints. • The ability to incorporate knowledge from related fields as needed and to advance research through collaboration with others. • The ability to logically and clearly explain and present research outcomes using scientifically grounded figures and data. • The ability to take a leading role in the entire research process, from research planning to experimental and computational work, data analysis, and academic dissemination of results (doctoral program only). • The ability to deepen own expertise while creating new research topics and technical approaches (doctoral program only).

Transferable Skills and Career Development Competencies

- The ability to collaborate effectively with researchers from diverse academic disciplines and cultural backgrounds.
- Fundamental professional skills required of researchers, including research progress management, time management, and adherence to deadlines.
- The ability to organize, formulate, and address research problems in the context of industry–academia collaborative research.
- Integrated and strategic thinking skills to understand research outcomes in relation to broader societal challenges (doctoral program only).

3. 研究指導方針 / Research Guiding Principle

Our activities are conducted based on a balance between close, supportive supervision focused on student growth and the cultivation of autonomy as professional researchers. Our laboratory comprises a large and diverse team, including doctoral students, many research and technical staff members, and researchers with industry experience, creating a rich research environment that benefits from diversity in expertise and nationality. Within this environment, we aim to foster individuals who are adaptable to change, capable of independent thinking, and able to grow proactively and continuously as researchers.

Research Guidance

- Upon joining the laboratory, students receive structured tutorials to systematically learn basic experimental operations, analytical methods, and scientific writing practices.
- Research topics are proposed in accordance with each student’s interests, aptitudes, and future career goals.
- In addition to faculty supervision, experienced technical staff members and doctoral students work closely with each student, providing continuous, hands-on guidance throughout their research activities.
- Progress review meetings are held once every three weeks to monitor research advancement and to adjust research directions as necessary.
- An open and friendly atmosphere is fostered in which students can freely engage in informal discussions and enjoyable research conversations, allowing challenges and insights to be naturally shared through daily interactions.

Academic Guidance

- In an environment where students and professional researchers learn together, students naturally acquire a learning cycle of “investigate → learn → organize → communicate → (teach)” through experiences of learning from senior members and mentoring junior members.
- By being regularly exposed to a wide variety of research topics, students broaden their interdisciplinary perspectives and share the experience of growing together as a research team.
- During progress review meetings (held once every three weeks), students engage in scientific discussions grounded in diverse areas of expertise, thereby developing international and interdisciplinary discussion skills.
- Through colloquia (held monthly, with each student presenting approximately four times per year), students refine their abilities to synthesize research outcomes and to communicate them effectively in both manuscript-style and presentation-style formats.

Career Support

- Alongside research activities, students develop practical skills valued in industry, including professional report writing and presentation skills.
- For conference presentations and collaborative research projects, sufficient preparation time is ensured to support the production of high-quality outputs.
- Through collaborative research with industry and interactions with working

professionals, students gain practical knowledge and perspectives from the industrial sector.

- Flexible career support is provided according to individual needs, including assistance with application documents, interview preparation, and participation in academic meetings.

4. 研究室活動の内容及び方法 / Content and Methods of Laboratory Activities

Daily Activities :

- Individual research activities, including experiments, simulations, and data analysis.
- Literature review and technical investigation relevant to each research topic.
- Frequent informal meetings and discussions: Faculty members and senior researchers continuously monitor students' research progress and provide one-on-one guidance as needed. Individual mentoring is conducted through daily interactions on research content, analytical approaches, preparation of figures and materials, and presentation structure.
- The laboratory adopts a self-directed research style without fixed core hours, allowing each member to design their own optimal research schedule to maximize productivity. At the same time, faculty and staff maintain close, ongoing support to ensure that students do not work in isolation.

Weekly Activities :

- Research progress meetings held once every three weeks, conducted in English.
- Members of three research groups within the laboratory—including professional researchers and master's and doctoral students—gather to share and discuss their research progress.
- Before and after presentations, mentors (faculty members and senior researchers) provide one-on-one guidance on presentation materials, logical structure, and scientific expression, thereby fostering practical international and interdisciplinary communication skills.

Monthly Activities :

- Colloquia held once per month.
- Students present their research in either manuscript-style or presentation-style formats, with participation from all research groups.
- During the preparation stage, mentors provide individualized one-on-one guidance on manuscript structure, figure preparation, and overall presentation design. Through these activities, students develop not only presentation skills but also the ability to ask questions and engage in constructive scientific discussions.

Occasional Activities :

- Participation in and presentation at domestic and international academic conferences.
- Collaborative research projects with industry and external partners.
- Training sessions for experimental equipment and participation in specialized workshops.

5. 年間スケジュール / Annual Schedule

本学の全学共通の年間スケジュールは「履修案内」の「学位取得に至るスケジュール」を参照してください。(本学HP参照：ホーム>教育>履修関係>履修案内)

Please refer to the “Degree conferment schedule for the master’s program/doctoral program” in the “Degree Completion Guide” for university-wide common schedule (JAIST website: Home > Education > Taking Courses > Degree Completion Guide)

Master Program

- 1st Year: (Jun–Aug) Tutorials and research planning; (Sep–Dec) Research initiation, progress meetings, first colloquium presentation, optional internship; (Jan–Mar) Research progress, optional job hunting.
- 2nd Year: (Apr–Aug) Mid-term evaluation, thesis planning; (Sep–Feb) Conference presentations, research consolidation, thesis writing and defense.

Doctoral Program

- 1st Year: Research progress and dissemination (conferences and publications)

- 2nd Year: Research deepening, dissemination, mid-term evaluation, job hunting
- 3rd Year: Research consolidation, doctoral thesis writing and defense