# CS2023 报告中 17 个分支领域对齐的专业品行

| 领域 | 专业品行<br>Professional Dispositions | CS2023 报告中的解释 |
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| 1.<br>人工智能(AI) | 严谨性<br>(Meticulousness)<br>坚持不懈<br>(Persistence)<br>责任感<br>(Responsible) | **Meticulousness:** Attention must be paid to details when implementing AI and machine learning algorithms, requiring students to be meticulous to detail.<br>**Persistence:** AI techniques often operate in partially observable environments and optimization processes may have cascading errors from multiple iterations. Getting AI techniques to work predictably takes trial and error, and repeated effort. These call for persistence on the part of the student.<br>**Responsible:** Applications of AI can have significant impacts on society, affecting both individuals and large populations. This calls for students to understand the implications of work in AI to society, and to make responsible choices for when and how to apply AI techniques. |
| 2.<br>算法基础(AL) | 严谨性<br>(Meticulous)<br>坚持不懈<br>(Persistent)<br>创造性<br>(Inventive) | **Meticulous:** As an algorithm is a formal solution to a computational problem, attention to detail is important when developing and combining algorithms.<br>**Persistent:** As developing algorithmic solutions to computational problems can be challenging, computer scientists must be resolute in pursuing such solutions<br>**Inventive:** As computer scientists develop algorithmic solutions to real-world problems, they must be inventive in developing solutions to these problems. |
| 3.<br>体系结构与组织(AR) | 自我指导<br>(Self-directed)<br>主动性<br>(Proactive) | **Self-directed:** students should increasingly become self-motivated to acquire complementary knowledge.<br>**Proactive:** students should exercise control and antecipate issues related to the underlying computer system. |
| 4.<br>数据管理(DM) | 严谨性<br>(Meticulous)<br>责任感<br>(Responsible)<br>协作性<br>(Collaborative)<br>反应灵敏<br>(Responsive) | **Meticulous:** Those who either access or store data collections must be meticulous in fulfilling data ownership responsibilities.<br>**Responsible:** In conjunction with the professional management of (personal) data, it is equally important that data be managed responsibly. Protection from unauthorized access as well as prevention of irresponsible, though legal, use of data is paramount. Furthermore, data custodians need to protect data not only from outside attack, but from crashes and other foreseeable dangers.<br>**Collaborative:** Data managers and data users must behave in a collaborative fashion to ensure that the correct data is accessed, and is used only in an appropriate manner. |

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| | | **Responsive:** The data that gets stored and is accessed is always in response to an institutional need/request. |
| 5.<br>编程语言基础<br>(FPL） | 严谨性<br>(**Meticulous**)<br>创造性<br>(**Inventive**)<br>主动性<br>(**Proactive**)<br>坚持不懈<br>(**Persistent**) | **Meticulous:** Students must demonstrate and apply the highest standards when using programming languages and formal methods to build safe systems that are fit for their purpose.<br>**Meticulous:** Attention to detail is essential when using programming languages and applying formal methods.<br>**Inventive:** Programming and approaches to formal proofs is inherently a creative process, students must demonstrate innovative approaches to problem solving. Students are accountable for their choices regarding the way a problem is solved.<br>**Proactive:** Programmers are responsible for anticipating all forms of user input and system behavior and to design solutions that address each one.<br>**Persistent:** Students must demonstrate perseverance since the correct approach is not always selfevident and a process of refinement may be necessary to reach the solution. |
| 6.<br>图形和交互技术<br>(GIT) | 自我指导<br>(**Self-directed**)<br>协作性<br>(**Self-directed**)<br>有效沟通至关重要<br>(**Effective communication is critical**) | **Self-directed:** self-learner, self-motivated. It is important for graphics programmers to keep up with technical advances.<br>**Collaborative:** team player: Graphics programmers typically develop on teams composed of people with differing specialties.<br>**Effective communication is critical.**<br>**a. oral**<br>**b. written**<br>**c. Code** |
| 7.<br>人机交互<br>(HCI） | 成长观念<br>(**Growth mindset**)<br>实践观念<br>(**Practice mindset**)<br>延迟满足感<br>(**Delayed gratification**)<br>坚持不懈<br>(**Persistence**) | We focus on dispositions helpful to students learning mathematics as well as professionals who need to refresh previously learned mathematics or learn new topics.<br>**Growth mindset.** Perhaps the most important of the dispositions, students should be persuaded that anyone can learn mathematics and that success is not based dependent on innate ability.<br>**Practice mindset.** Students should be educated about the nature of “doing” mathematics and learning through practice with problems as opposed to merely listening or observing demonstrations in the classroom.<br>**Delayed gratification.** Most students are likely to learn at least some mathematics from mathematics departments unfamiliar with computing applications; computing departments should acclimate the students to the notion of waiting to see computing applications. Many of the new growth areas such as AI or quantum computing can serve as motivation.<br>**Persistence.** Student perceptions are often driven by frustration with unable to solve hard problems that they see some peers tackle seemingly effortlessly; computing departments should help promote the notion that eventual success through |

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| | | persistence is what matters. |
| 8. 数学与统计学基础(MSF) | 成长观念<br>(Growth mindset)<br>实践观念<br>(Practice mindset)<br>延迟满足感<br>(Delayed gratification)<br>坚持不懈<br>(Persistence) | We focus on dispositions helpful to students learning mathematics as well as professionals who need to refresh previously learned mathematics or learn new topics.<br>**Growth mindset.** Perhaps the most important of the dispositions, students should be persuaded that anyone can learn mathematics and that success is not based dependent on innate ability.<br>**Practice mindset.** Students should be educated about the nature of “doing” mathematics and learning through practice with problems as opposed to merely listening or observing demonstrations in the classroom.<br>**Delayed gratification.** Most students are likely to learn at least some mathematics from mathematics departments unfamiliar with computing applications; computing departments should acclimate the students to the notion of waiting to see computing applications. Many of the new growth areas such as AI or quantum computing can serve as motivation.<br>**Persistence.** Student perceptions are often driven by frustration with unable to solve hard problems that they see some peers tackle seemingly effortlessly; computing departments should help promote the notion that eventual success through persistence is what matters. |
| 9. 网络与通信(NC） | 严谨性<br>(Meticulous)<br>协作性<br>(Collaborative)<br>主动性<br>(Proactive)<br>专业性<br>(Professional)<br>反应灵敏<br>(Responsive)<br>适应性<br>(Adaptive) | **Meticulous:** In meeting being able to design networks and communication systems.<br>**Collaborative:** Working in groups to achieve a common objective.<br>**Proactive:** Anticipating changes in needs and acting upon them.<br>**Professional:** Complying to the needs of the community in a responsible manner.<br>**Responsive:** Acting swiftly to changes in needs.<br>**Adaptive:** Making the required changes happen when needed |
| 10. 操作系统(OS) | 主动性<br>(Proactively)<br>严谨性<br>(Meticulously) | **Proactively** considers the implications for security and performance of decisions<br>**Meticulously** considers implication of OS mechanisms on any project |
| 11. 并行与分布式计算(PDC) | 严谨性<br>(Meticulous)<br>坚持不懈<br>(Persistent) | **Meticulous:** Attention to detail is essential when applying constructs with non-obvious correctness conditions.<br>**Persistent:** Developers must be tolerant of the common need to revise initial approaches when solutions are not self-evident |
| 12. 软件开发基础(SDF) | 自我指导<br>(Self-Directed)<br>实验性<br>(Experimental)<br>技术好奇心<br>(Technical | **Self-Directed.** Seeking out solutions to issues on their own (e.g., using technical forums, FAQs, discussions).<br>**Experimental.** Practical experimentation characterized by experimenting with language features to understand them, quickly prototyping approaches, and using the debugger to understand |

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| | curiosity)<br>技术适应能力<br>(Technical adaptability)<br>毅力<br>(Perseverance)<br>条理性<br>(Systematic) | why a bug is occurring.<br>**Technical curiosity.** Characterized by, for example, interest in understanding how programs are executed, how programs and data are stored in memory.<br>**Technical adaptability.** Characterized by willingness to learn and use different tools and technologies that facilitate software development.<br>**Perseverance.** To continue efforts until, for example, a bug is identified, a program is robust and handles all situations, etc.<br>**Systematic.** Characterized by attention to detail and use of orderly processes in practice. |
| 13.<br>软件工程(SE) | 协作性<br>(Collaborative)<br>专业性<br>(Professional)<br>沟通<br>(Communicative)<br>严谨性<br>(Meticulous)<br>负责任<br>(Accountable) | **Collaborative:** Software engineering is increasingly described as a “team sport” - successful software engineers are able to work with others effectively. Humility, respect, and trust underpin the collaborative relationships that are essential to success in this field.<br>**Professional:** Software engineering produces technology that has the chance to influence literally billions of people. Awareness of our role in society, strong ethical behavior, and commitment to respectful day-to-day behavior outside of one’s team are essential.<br>**Communicative:** No single software engineer on a project is likely to know all of the project details. Successful software projects depend on engineers communicating clearly and regularly in order to coordinate effectively.<br>**Meticulous:** Software engineering requires attention to detail and consistent behavior from everyone on the team. Success in this field is clearly influenced by a meticulous approach - comprehensive understanding, proper procedures, and a solid avoidance of cutting corners.<br>**Accountable:** The collaborative aspects of software engineering also highlight the value of accountability. Failing to take responsibility, failing to follow through, and failing to keep others informed are all classic causes of team friction and bad project outcomes. |
| 14.<br>安全(SEC) | 严谨性<br>(Meticulous)<br>自我指导<br>(Self-directed)<br>协作性<br>(Collaborative)<br>责任感<br>(Responsible)<br>负责任<br>(Accountable) | **Meticulous:** students need to pay careful attention to details to ensure the protection of real-world software systems.<br>**Self-directed:** students must be ready to deal with the many novel and easily unforeseeable ways in which adversaries might launch attacks.<br>**Collaborative:** students must be ready to collaborate with others , as collective knowledge and skills will be needed to prevent attacks, protect systems and data during attacks, and plan for the future after the immediate attack has been mitigated.<br>**Responsible:** students need to show responsibility when designing, developing, deploying, and maintaining secure systems, as their enterprise and society is constantly at risk.<br>**Accountable:** students need to know that as future |

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| | | professionals that they will be held accountable if a system or data breach were to occur, which should strengthen their resolve to prevent such breaches from occurring in the first place. |
| 15.<br>社会、伦理与职业化(SEP) | 批判性自我反思<br>**(Critical Self-reflection)**<br>反应灵敏<br>**(Responsiveness)**<br>主动性<br>**(Proactiveness)**<br>文化胜任力<br>**(Cultural Competence)**<br>倡导<br>**(Advocation)** | **Critical Self-reflection** - Being able to inspect one’s own actions, thoughts, biases, privileges, and motives will help in discovering places where professional activity is not up to current standards. Understand both conscious and unconscious bias and continuously work to counteract them.<br>**Responsiveness** - Ability to quickly and accurately respond to changes in the field and adapt in a professional manner, such as shifting from in-person office work to remote work at home. These shifts require us to rethink our entire approach to what is considered “professional”.<br>**Proactiveness** - Being professional in the workplace means finding new trends (e.g. in accessibility or inclusion) and understanding how to implement them immediately for a more professional working environment.<br>**Cultural Competence** - Prioritize cultural competence—the ability to work with people from cultures different from your own—by using inclusive language, watching for and counteracting conscious and unconscious bias, and encouraging honest and open communication.<br>**Advocation** - Thinking, speaking and acting in ways that foster and promote inclusion, diversity, equity and accessibility in all ways including but not limited to teamwork, communication, and developing products (hardware and software). |
| 16.<br>系统基础(SF) | 严谨性<br>**(Meticulousness)**<br>适应性<br>**(Adaptiveness)** | **Meticulousness:** students must pay attention to details of different perspectives when learning about and evaluating systems.<br>**Adaptiveness:** students must be flexible and adaptive when designing systems. Different systems have different requirements, constraints and working scenarios. As such, they require different designs. Students must be able to make appropriate design decisions correspondingly |
| 17.<br>专业平台开发(SPD) | 学会学习<br>**(Learning to learn )**<br>创造性<br>**(Inventiveness)**<br>适应性<br>**(Adaptability)** | **Learning to learn** (new platforms, languages)<br>**Inventiveness** (in designing software architecture within non-traditional constraints)<br>**Adaptability** (to new constraints) |