

**MASTER'S DEGREE IN  
ANALYTICS AND DATA SCIENCE FOR ECONOMICS AND MANAGEMENT**

**A.Y. 23-24**

**Admission Test**

The Admission Board requests applicants an oral interview for admission, held in English language and done via Teams. The oral interview is aimed at verifying the individual knowledge and skills in three main fields: Computer science, Mathematics and Statistics. The table below reports a detailed list of topics, together with references, that can be asked during the interview.

<b>Field</b>	<b>Topics</b>	<b>References</b>
Computer science	Information Technology: <ul style="list-style-type: none"><li>- PC architecture.</li><li>- Operating systems.</li><li>- Computer networks.</li><li>- Information formalization: binary, analog, digital coding.</li><li>- Information processing: flow charts and algorithms.</li><li>- Information management: relational databases.</li><li>- Access to information: Web and search engines.</li></ul> Spreadsheets: <ul style="list-style-type: none"><li>- Basic concepts.</li><li>- Formulas and basic mathematical functions; some specific functions: IF, AND, OR, COUNTIF, SUMIF, VLOOKUP, CONCATENATE, MID</li><li>- Handling lists.</li><li>- Goal Seek and Solver.</li><li>- Charts.</li><li>- Pivot tables.</li></ul>	F 1, 2, 4, 5, 6, 8  DCBE 1, 3, 4
Mathematics	<ul style="list-style-type: none"><li>- Matrix and vector algebra, rank of a matrix, determinant and inverse matrix, systems of linear equations.</li><li>- Real functions of one variable</li><li>- Calculus for function of n-variables, optimization of function of n- variables, constrained optimization.</li><li>- Series. Integration.</li></ul>	SB
Statistics	Theory and application of the following topics: <ul style="list-style-type: none"><li>a) Data description, summary, and interpretation</li><li>- frequency tables and graphs</li></ul>	CDM-E 1-23

	<ul style="list-style-type: none"> <li>- statistical measures of central tendency, variability, asymmetry, inequality</li> <li>- simple and composite index numbers</li> <li>- multi-way tables; conditioned distributions and indexes</li> <li>b) Probability theory: discrete and continuous random variables</li> <li>c) Statistical inference <ul style="list-style-type: none"> <li>- point and interval estimation</li> <li>- tests of hypothesis</li> </ul> </li> <li>d) Bivariate and multivariate analysis <ul style="list-style-type: none"> <li>- Association and independence test</li> <li>- Mean dependence and ANOVA</li> <li>- Simple and multiple linear regression model</li> </ul> </li> </ul>	<p>McCS 10 (no 10.5),12.1-12.4, 12.11-12.12</p>
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## References

### **Computer science**

(F) Fox R., Information Technology: An Introduction for Today's Digital World (2nd ed.), Taylor&Francis, 2021. ISBN: 978-03-678-2021-3.

(DCBE) De Pra M., Clerici A., Ballerini M., Excel for students in economics and finance, Egea, 2020. ISBN: 978-88-238-2293-1.

Any updated textbook on introductory information technology includes the required topics. Online resources are available for example at [https://en.wikiversity.org/wiki/IT\\_Fundamentals](https://en.wikiversity.org/wiki/IT_Fundamentals)

Any updated textbook on advanced Excel includes the required subjects. Online resources are available for example at <https://en.wikiversity.org/wiki/IC3/Spreadsheets>

### **Mathematics**

(McCS) McClave J.T., Sincich T.T., Statistics (13th ed.), Pearson, 2017. ISBN: 978-01-34-08021-5.

(SB) Simon C., Blume L. Mathematics for Economists, W. W. Norton & Company, 2010. ISBN: 978-03-9311-752-3.

In case of unavailability of the mathematics textbooks listed above, you can refer to online resources, available for example at:

<https://www.my-mooc.com/en/categorie/calculus>

<https://openstax.org/details/books/calculus-volume-1>

<https://openstax.org/details/books/calculus-volume-2> (chapters 1-2-3)

[https://math.libretexts.org/Courses/Monroe\\_Community\\_College/MTH\\_210\\_Calculus\\_I\\_\(Seeburger\)](https://math.libretexts.org/Courses/Monroe_Community_College/MTH_210_Calculus_I_(Seeburger))

[https://math.libretexts.org/Courses/Monroe\\_Community\\_College/MTH\\_212\\_Calculus\\_II](https://math.libretexts.org/Courses/Monroe_Community_College/MTH_212_Calculus_II)

[https://math.libretexts.org/Courses/Monroe\\_Community\\_College/MTH\\_211\\_Calculus\\_II](https://math.libretexts.org/Courses/Monroe_Community_College/MTH_211_Calculus_II)

<https://www.math.ucdavis.edu/~linear/linear-guest.pdf>

### **Statistics**

(CDM-E) Cicchitelli G., D'Urso P., Minozzo M., Statistics: principles and methods, Pearson, 2021. ISBN: 978-8891911032

In case of unavailability of the Statistics textbooks listed above, you can refer to online resources, available for example at:

<https://openstax.org/details/books/introductory-statistics>

[https://onlinestatbook.com/Online\\_Statistics\\_Education.pdf](https://onlinestatbook.com/Online_Statistics_Education.pdf)