

**Federal University of Minas Gerais
School of Engineering**

**Graduate Program in
Sanitation, Environment and Water Resources**

Regular Selection Notice 2018/1 – Masters and Doctorate

The Coordinator of the Graduate Program in Sanitation, Environment and Water Resources of the School of Engineering of the Federal University of Minas Gerais (PPG-SMARH) hereby informs that, from **October 9 to November 3, 2017**, applications will be accepted for the selection of candidates for the Masters and Doctorate courses.

1 – PRELIMINARY INFORMATION

1.1 Applications will be made **exclusively online**. To apply, the candidate must access the Program's website, complete the application form and submit it with the other documents requested in item II of this Notice, in PDF format, during the application period. Contacts: Tel. +55(31)3409-1882, e-mail: posgrad@desa.ufmg.br, website: www.smarh.eng.ufmg.br

1.2 For additional information, the Secretariat of the Graduate Program in Sanitation, Environment and Water Resources works at the following address: **UNIVERSIDADE FEDERAL DE MINAS GERAIS (UFMG). Belo Horizonte/MG. Av. Antônio Carlos, 6627, Pampulha. Escola de Engenharia da UFMG - Bloco 1 - 4º Andar - Sala 4619. CEP 31270-901.** The Secretariat's open office hours are from Monday to Friday, 9:00 am to 12 noon.

2 – THE OPENINGS

2.1 Offered for admission in the first semester of 2018 are **32 (thirty two)** openings for the MASTERS PROGRAM, consisting of 10 (ten) openings in the area of Sanitation, 10 (ten) openings in the area of Environment and 12 (twelve) openings in the field of Hydraulics and Water Resources. Offered for admission in the first semester of 2018 are **12 (twelve)** openings for the DOCTORATE PROGRAM, consisting of 4 (four) openings in the area of Sanitation, 4 (four) openings in the area of Environment and 4 (four) openings in the field of Hydraulics and Water Resources. In compliance with Resolution n. 02/2017 of 04 April 2017, of the UFMG Teaching, Research and Extension Council, which provides for the Affirmative Action Policy within the University, 7 of the 32 vacancies for the Master's Program will be reserved for candidates who self-declare their race as Black and 3 of the 12 vacancies for the Doctorate Program will be reserved for candidates who self-declare their race as Black.

2.2 Self-declaration and the option to reserve openings must be made at the time of registration. Those opting for participation in the selection process for the openings reserved for self-declared black candidates will only compete for the reserved vacancies, except in the cases of items 6.3.1 to 6.3.3 of this notice.

2.3 Candidates who do not opt for the reserved openings will automatically be directed to the broad competition openings. The following table summarizes the distribution of openings by concentration area, broad competition openings and those reserved for self-declared black candidates.

Field of concentration	Masters		Doctorate	
	Broad competition	Reserved opening	Broad competition	Reserved opening
Sanitation	8	2	3	1
Environment	8	2	3	1
Hydraulics and Water Resources	9	3	3	1
Total	25	7	9	3
Overall total	32		12	

3 – REQUIREMENTS FOR REGISTRATION

3.1 Candidates must hold an undergraduate degree, recognized in accordance with current legislation. The candidate must enroll in one of the *stricto sensu* graduate levels (master's or doctoral) of one of the three areas of concentration: (i) Sanitation; (ii) Environment; (iii) Hydraulics and Water Resources. For candidates who self-declare themselves black, there will be an option established in the Application Form to indicate their selection in the Reserved Opening modality. The other candidates will be entered in the Broad Competition modality. Applications require completing the Electronic Registration Form directly on the Program's webpage and also by submitting it in full during validity of the registration of the scanned documents (**PDF** format, only the photo will be in JPEG format).

3.2 DOCUMENTS REQUIRED FOR ALL CANDIDATES

a) Registration form in standard format established by the Program Coordination and available at <http://www.smarh.eng.ufmg.br>

b) A recent 3x4 photograph (JPEG format);

c) Transcript of the undergraduate course and certificate of completion of the undergraduate course (Diploma - front and back - or equivalent) or other document proving that the candidate is in a position to complete the undergraduate course before the academic registration period in the graduate course, recorded as conditional upon completion of the undergraduate course.

d) *Curriculum Vitae* – detailed, Curriculum Lattes model (see <http://lattes.cnpq.br/>);

e) *Curriculum Vitae* - summarized in the standard model indicated by the Program Coordination, available at: <http://www.smarh.eng.ufmg.br/selecao.php>

f) Supporting documents of all items reported in the *summarized Curriculum Vitae*, and the lack of any of these documents will imply non-punctuation in the item to which it refers. **These documents must be organized and numbered according to the sequence in which they are mentioned in the summarized Curriculum Vitae;**

g) Personal Documents: Birth or marriage certificate; Identity card or identification document nationally recognized by law and within the validity period; National Registration of Individuals C.P.F. (if not on the valid identification document); Document of discharge from Military service (when applicable); Proof of residence; Electoral discharge certificate to be obtained at: <http://www.tse.jus.br/eleitor/certidoes/certidao-de-quitacao-eleitoral> (individual proof of voting will not be accepted) or certificate issued by the TRE;

h) Foreign candidates must also submit the documents required by the specific legislation - information available at: <https://www2.ufmg.br/drca/drca/Home/Pos-Graduacao/Registro-Academico>

i) Self-declared black candidates, who opt to compete for the reserved openings, must present a detailed and reasoned letter about their ethnic background, according to what is provided in the CEPE/UFMG Resolution no. 02/2017. The document, duly signed, must also include the identification of the applicant, full name, ID number and CPF.

3.3 ADDITIONAL DOCUMENTS REQUIRED ONLY FOR DOCTORATE CANDIDATES

a) If the candidate has a Master's degree, he/she must send a school transcript and proof of completion of the Master's course;

b) Declaration of availability, issued by the candidate, expressing commitment to exclusive or partial dedication, in the latter case with dedication of at least 30 (thirty) hours per week during the entire doctoral period (48 months);

c) **Two letters of recommendation.** The candidate must inform the email addresses of 2 (two) individuals in the online form to provide recommendation letters. These individuals will be informed automatically via e-mail and must indicate that they accept to prepare the letters. They must access the link where they will fill in the fields of the letter of recommendation. Once this has been done, the system will notify the Secretariat and the candidate of completion. If the candidate wishes, he/she may change the referrals indicated (within the registration deadline), provided that the letter of recommendation has not been submitted by the previously indicated individual. The letters of recommendation can be submitted in Portuguese, Spanish or English. **Note: It is the responsibility of the candidate to ensure that the two letters of recommendation are submitted by the indicated individuals.**

d) **Research plan**, presented in the template available at <http://www.smarh.eng.ufmg.br/selecao.php>, including definition of the line of research of **the Program, whose listing and description are available on the webpage (<http://www.smarh.eng.ufmg.br/linhaspesq.php>)**. The Research Plan should be presented with a cover page including the title Research Plan, the line of research selected and the signature of the candidate. For the preparation of the Research Plan, it is recommended to consult the PPG-SMARH website for further information on the main research topics underway in the Program, available on its website (<http://www.smarh.eng.ufmg.br/linhaspesq.php>). The Candidate will also find the descriptions of ongoing research projects in the Lattes CVs of the Program faculty.

e) **Autobiography.** The Autobiography must be presented with a cover page (which does not count as a page) with identification of the selected line of research and the candidate's signature. The autobiography must be written by the candidate, with no more than 5 pages, including the research project in the context of his/her scientific and academic trajectory, and presenting the insertion of his/her postgraduate studies in his/her plan for acting as a researcher.

3.4 INFORMATION FOR ALL CANDIDATES

3.4.1 During the registration period, the candidate may modify his/her registration if desired by returning his/her documentation, where the last version submitted via the website will be used for the Selection Process.

3.4.2 The submitted documents must be legible, properly framed on the page (in the position that facilitates reading without the need to rotate the page), without shadows or stains that make it difficult to read and without cutting the margins of the text by inappropriate framing (truncated text); **failure to comply with these requirements will result in rejection of the application.**

3.4.3 Only applications that meet the requirements of this Notice and that have complete documentation will be accepted.

3.4.4 Applicants with disabilities and/or specific needs must indicate, in the application form, the special conditions necessary for their participation in the selection process.

3.4.5 UFMG will not be responsible for applications not received for reasons of technical nature associated with computers, communication failures, congestion of communication lines or for any other technical reason that make it impossible to transfer data for completion of the registration process.

3.4.6 After registration, candidates will receive an identification number that will be used to maintain their anonymity in all subsequent stages of the selection process.

3.4.7 The documents of all candidates will be analyzed by the SMARH Secretariat from **November 06 to 09, 2017**. Candidates with complete documentation and in compliance with the terms of the Notice will have their registrations **approved**.

3.4.8 In case the candidate is approved in the selection process of this Notice, printed copies of the scanned documents will be requested for the school transcripts with originals for verification. See item 8.1 of this Notice for the dates and instructions.

4 –THE EXAMINING COMMITTEE

Selection of candidates for the Masters and Doctorate programs will be performed by Examining Commissions corresponding to the areas of concentration of the Program, designated by the Collegiate, each composed of at least two dedicated professors and one substitute professor, all holders of a doctorate degree and accredited professors of the Program. The members making up the Examining Committees will be disclosed in the Secretariat and on the Program's web page, up to 48 hours before the start of the selection process, along with the Declaration of No Disqualification and Suspicion of each member of the selection committee in function of the candidates enrolled in this selection process.

5 – THE SELECTION PROCESS

5.1 MASTERS: The candidate selection process for the Master's program will be divided in two stages.

5.1.1 1st stage, for qualification and elimination. This stage will consist of two evaluations:

5.1.1.1 Specific knowledge exam, written, in the respective field of concentration, without consultations for a total of **45 points**. The candidate must not obtain a score less than 25 points on this exam. The program and the bibliography suggested for this test are available in **Annex I** of this Notice and on the Program's website. This exam will be held on **November 20, 2017, group 1 from 09:30 to 11:30 and group 2 from 1:00 pm to 3:00 p.m., Brasília time**, at the UFMG, Pampulha Campus, Av. Antônio Carlos 6627, in Belo Horizonte, in a room to be informed by the Program Secretariat. Division into groups will be performed by the Program Secretariat and informed on the PPG-SMARH webpage (<http://smarh.eng.ufmg.br/>) before **November 17, 2017**.

5.1.1.1.1 The specific knowledge exam, written, may also be taken at the institutions listed below:

- (i) Northern region: Universidade Federal do Pará, in Belém.
- (ii) Northeast region: Universidade Federal do Ceará, in Fortaleza; Universidade Federal de Alagoas, in Maceió; Universidade Federal do Recôncavo da Bahia Campus, in Cruz das Almas-BA,.

- (iii) Midwest region: Universidade de Brasília, in Brasília; Universidade Federal do Mato Grosso, in Cuiabá;
- (iv) Southern region: Universidade Federal de Santa Catarina, in Florianópolis.
- (v) Brazilian embassies, in accordance with demand expressed by the candidates until the final registration date.

5.1.1.1.2 To take the specific knowledge exam outside the UFMG Pampulha Campus, candidates must select the desired institution, among those listed, on the application form. There is a limit of **10 openings per institution listed**, with vacancies filled in the order of registration. If there are no vacancies in the desired institution, the candidate may choose to take the test at the UFMG Pampulha Campus or at another institution on the list.

5.1.1.1.3 All exams will be conducted on the same day, November 20, 2017. The tests in Brazil will be held at the times listed in the first paragraph of this item, with reference to Brasilia time. The tests taken abroad may have a specific time, taking into account the time zones. The Evaluation Commissions will elaborate, as necessary, different tests for different schedules, maintaining the same level of difficulty and thematic scope of evaluation. The candidate who chooses to take the written exam in one of the listed institutions, outside the UFMG Pampulha Campus, must look up the place, the contact teacher and the time of the test on the webpage of the PPG-SMARH, as of **November 16, 2017**.

5.1.1.2 Curriculum analysis, worth **35 points**, distributed among the subjects (I) “professional experience in the area after graduation”, with a maximum score of 10 points, (ii) “published scientific papers”, with a maximum of 10 points, (iii) “performance in undergraduate, in monitoring, scientific initiation and/or internships”, with a maximum of 10 points, (iv) “*stricto sensu* and/or *lato sensu* graduate degrees”, with a maximum of 5 points, **considering the activities relevant to the area of concentration in which the candidate is registered.**

5.1.1.3 The score of this stage will be the sum of the scores obtained in the evaluations specified in “5.1.1.1” and “5.1.1.2”. Candidates who score less than 40 points in this first stage, or less than 25 points in the specific knowledge exam, will be considered rejected. The remaining candidates will be ordered by their scores in the 1st stage, and those called for the 2nd stage will be only the best classified, with a limit of 1.5 times the number of openings offered, rounding up to the next higher integer, according to the following distribution by area of concentration: (i) Sanitation: the 12 best classified in the Broad Competition and 3 classified for the Reserved Openings; (ii) Environment: the 12 best classified in the Broad Competition and 3 classified for the Reserved Openings; (iii) Hydraulics and Water Resources: the 14 best classified in the Broad Competition and 5 classified for the Reserved Openings.

5.1.1.4 If there is a tie among the candidates ranked last in the call for the 2nd stage, no tie-breaking criteria will be applied and the tied candidates will continue to the 2nd stage, thus increasing the number of candidates allocated. The results of this 1st stage with the indication of candidates called for the 2nd stage, as well as the scores of all the candidates who participated in the selection process, will be announced in the Secretariat and on the Program’s website on **November 24, 2017**.

5.1.2 2nd stage, exclusively for classification. Interview, worth 20 points, that will be attributed based on the following criteria: technical-scientific qualification of the candidate and his/her motivation and availability to undertake the graduate program. The discussions will be individual, and when in person, will be held on the premises of the Department of Sanitary and Environmental Engineering and the Department of Hydraulic Engineering and Water Resources of the School of Engineering, UFMG, located on the fourth floor of Block 1 of the headquarters of the EEUFMG, Campus Pampulha, Av. Antonio Carlos 6627, in Belo Horizonte.

5.1.2.1 This stage will be held on **December 6 and 7, 2017**, where the time and place will be announced by the Program Secretariat, on the website, and also posted on the Secretariat's notice board, on **December 5, 2017**.

5.1.2.2 For candidates who opted to do the 1st stage of the selection process outside the Pampulha Campus of UFMG or residing outside the state of Minas Gerais, the 2nd stage may be conducted by means of an online Skype interview. The Examining Committee will contact each candidate who took the test outside of the UFMG Pampulha Campus facilities or who reside outside the state of Minas Gerais to establish an interview time. This candidate must provide a means of online videoconference and inform their electronic address (Skype) in the application form. The candidate will be responsible for testing the connection with the College, if requested, guaranteeing internet bandwidth with compatible speed for real time sound and image. **The College will not be responsible for connection problems outside of its local network.**

5.2 DOCTORATE: The selection process of Doctorate candidates will be both eliminatory and for classification, consisting of 3 evaluations worth a total of 100 points To be approved, the candidate must obtain at least 60% of the total points (100 points) distributed in the three evaluations.

5.2.1 Curriculum analysis, worth 40 points, distributed among (i) "professional experience", with a maximum score of 10 points, (ii) "scientific papers published", with a maximum of 20 points, and (iii) *Stricto Sensu* and *Lato Sensu* degree in the field of study, with a maximum of 10 points;

5.2.2 Analysis of the written text and oral interview regarding the Research Plan, worth 45 points, which will be based on the following criteria: format, pertinence of the subject, scientific merit, clarity in expressing of ideas, capacity to conduct the works, feasibility of execution of the research and adherence of the Plan to one of the research lines of the Program and research topics of current interest of the faculty, as described on the page of the PPG-SMARH (<http://www.smarh.eng.ufmg.br/linhaspesq.php>). In order to assess the feasibility of carrying out the research, the adequacy of the indicated research line, the availability of guidance and the technical and financial capacity for its implementation in the Program will be taken into account.

5.2.3 Analysis of the written text and oral discussion on the candidates Autobiography, worth 15 points, which will be conducted based on general evaluation of the preparation and motivation of the candidate for development of his/her doctoral program, considering the following aspects: adequacy of his/her educational background for graduate studies in the Program, compatibility of the candidate's profile with the areas and lines of research of the Program, and the availability to conduct the doctorate program.

5.2.4 Release of the time and place for Interviews regarding the Research Plan and Autobiography for each candidate will be indicated on **November 14, 2017** on the PPG-SMARH website.

5.2.5 The analysis and oral interview regarding the Research Plan and the Autobiography will be held between the **21st (Tuesday) and 24th (Friday) of November 2017**, either in person or alternatively via the online Skype program for candidates residing outside of Belo Horizonte. In the latter case, the applicant must request that these evaluations be conducted via an online videoconference at the time of registration. The Examining Committee will contact each candidate who requested the evaluations via Skype to define a schedule for the same period from November 21 to 24, 2017.

5.2.6 To conduct the evaluations online by means of Skype, the candidate must provide a means of videoconference communication and inform his/her respective electronic address (Skype) in the application form. **The candidate will be responsible for testing the connection with the College, if requested, guaranteeing internet bandwidth with sufficient speed for real time sound and image emission. The College will not be**

responsible for connection problems outside of its local network.

6 – THE FINAL RESULTS

6.1 MASTERS

The Final Score of the candidates who participated in all stages of the selection process is the sum of the scores of the Knowledge Exam, Curriculum Analysis and Interview. Candidates of the Broad Competition and Reserved Openings will be independently ranked in descending order of the final score, by concentration area, with the indication of “**approved and classified**” or “**approved but not classified**”. Approved and classified candidates will be admitted to the master’s program by field of concentration within the limit of vacancies made available in this Notice. The score obtained in the Knowledge Exam will be used as a criterion in the case of a tie-break between candidates, followed by the Curriculum Analysis. If the tie continues, the Examining Committee will make a decision by lot, with the presence of the tied candidates.

6.2 DOCTORATE

The Final Score of the candidates who participated in all stages of the selection process is the sum of the scores obtained in the Curriculum Analysis, Research Plan and Autobiography. Candidates of the Broad Competition and Reserved Openings will be independently ranked in descending order of the final score, by concentration area, with the indication of “**approved and classified**” or “**approved but not classified**” or “**disapproved**”. Approved and classified candidates will be admitted by area of concentration, within the number of openings offered in this Notice. The score obtained in the Research Plan Analysis will be used as a criterion in the case of a tie-break between candidates, followed by the Curriculum Analysis and Autobiography analysis.

6.3 GENERAL INFORMATION, FOR MASTERS AND DOCTORATE

6.3.1 If there is a withdrawal of a self-declared black candidate, approved for the Reserved Openings, the vacancy will be filled by the self-declared black candidate with the next highest final score.

6.3.2 If there are not sufficient approved self-declared black candidates to fill the reserved openings, the remaining openings will be filled by candidates approved in Broad Competition, filled in descending order of the final score.

6.3.3 If there are not enough candidates to fill the openings in the Broad Competition, the remaining vacancies will be filled by the approved self-declared black candidates, filled in descending order of the final score.

6.3.4 Homologation of the results obtained by the Examining Commissions of the **Master and Doctorate Programs** will be carried out by the Program Coordination on **December 12, 2017**, according to the conditions of this Notice, the Program Regulations, the General Regulations of the UFMG Graduate Program, Statute and General Regulations of UFMG and the pertinent federal legislation.

6.3.5 The results of the **Master’s and Doctorate** selection will be published in the Program Secretariat and made available on the Program’s webpage on **December 13, 2017**, with the scores obtained at each stage of the process and the Final Score in decreasing order by area of concentration, along with indication of the results: “approved and classified”, “approved but not classified” or “disapproved”.

7 - RESOURCES

7.1 According to the General Regulations of the UFMG and Resolution 13/2010, of November 11, 2010 of the University Council of UFMG, the deadline for appeal against the results of the selection process is 10 (ten) calendar days after the date of disclosure of the final result. During this period the candidates will have access to their respective evaluations.

7.2 In the case of selection for the **Master's Program**, because it is divided into two stages, an appeal against the result of the first stage can be made, with suspensive effect, without prejudice to the final appeal. The appeal against the result of the 1st stage must be submitted by **December 4, 2017**. The result of the 2nd stage will be announced with the final result.

7.3 Appeals should be directed to the Program Coordination and delivered, in person or by attorney-in-fact with simple power of attorney, to the Program Secretariat, at the address and operating hours informed in item 1 of this Notice. During the appeals, the candidates will have access to their respective evaluations.

8 – REGISTRATION – MASTERS AND DOCTORATE.

8.1 The candidate approved and classified in the selective process of this Notice is expected to pre-register exclusively online from **January 01 to 15, 2018**, by completing the form available on the website <https://sistemas.ufmg.br/cadastroprevio/>.

Approved candidates must provide copies of all documentation submitted in the online application (along with the original documents for confirmation) by **February 15, 2018** at the **PPG-SMARH Secretariat**. The Department of the Registrar and Academic Control (Departamento de Registro e Controle Acadêmico - DRCA) of the UFMG will take steps to complete the Academic Registration upon receipt of the complete documentation of the selected candidates, in the required forms (legible copies and no errors), and completion of the Pre-Registration Form by the classified candidate. Complete documentation of the selected candidates must be sent to the DRCA by the Course Secretary **by February 22, 2018**.

8.2 The candidate who, during the enrollment period, presented a document indicating that he or she is in a position to complete the undergraduate course prior to the academic registration period for the graduate course, shall deliver to the Program Secretariat **by February 15, 2018**, a document proving the completion of the undergraduate course (copy of the diploma issued by an official or officially recognized institution or declaration of completion of the course that includes the date of the graduation). Declarations with expected completion or graduation will not be accepted. In the case of an undergraduate course completed abroad, a copy of the diploma of an undergraduate course with a consular authentication stamp must be presented, in accordance with current legislation, as well as a sworn translation of the undergraduate course diploma into Portuguese, except for those issued in English, Spanish and French.

8.3 Foreign applicants must submit to the Program Secretariat, by **February 15, 2018**, the National Alien Registration (Registro Nacional de Estrangeiro – RNE), or passport with valid Permanent Visa or Temporary Student Visa, documentation proving filiation and other documents to be informed by the Program Secretariat.

8.4 Simultaneous academic registration in more than one undergraduate or graduate course or at both levels is prohibited. Pursuant to article 39, § 2 of the Regimento Geral of UFMG: “each student shall have the right to a single academic record, corresponding to a single opening in the course in which he/she was admitted to the UFMG”. **The classified candidate who does not complete the Pre-Registration by the date set for conducting this procedure or who does not submit any of the documents requested in this Notice will automatically lose the right to the opening and be considered formally withdrawn.** Filling the opening(s) resulting from these

situations will be done by calling other approved candidates, strictly observing the order of classification according to the decreasing order of points obtained in the selection process, until the deadline for sending the documentation to the DRCA.

8.5 Registration of the approved and classified candidates will be carried out in the Graduate Academic System, according to the Secretariat of the Program, on a date to be disclosed, observing the academic calendar of the University.

8.6 In compliance with Resolution No. 08/2008, of October 14, 2008 of the Teaching, Research and Extension Council of UFMG, the masters and doctoral students selected in the selection examination referred to in this Notice must take **foreign language** exams in the maximum periods of **7 months for the master's degree and 20 months for the doctorate degree**, from the date of the first enrollment in the Program. Passing this test is required for the continuation of postgraduate studies, in the master's or doctorate degree, requiring a minimum score of 60%. Master's students must take a written exam of English knowledge. Simultaneously, doctoral students must demonstrate proof of English knowledge and a second foreign language, chosen from German, Spanish, French and Italian. Information about these exams can be obtained from the Program Secretariat.

Belo Horizonte, October 04, 2017. Prof. Nilo Oliveira Nascimento, Coordinator of the Graduate Program in Sanitation, Environment and Water Resources.

ANNEX I

SUGGESTED PROGRAM AND BIBLIOGRAPHY FOR THE SPECIFIC KNOWLEDGE EXAM – MASTER'S PROGRAM

Observation: the listed bibliography is a suggestion. Other references may be used by the applicant if they cover the topics included in the program.

I. Area of concentration: SANITATION Program

1. Sanitation and public health. Historical evolution. Sanitation situation in Brazil. Notions of biostatistics. Environmental control of sanitation-related diseases.
2. Public policies: Institutional perspective. Sanitary engineering and its areas of actuation.
3. Water supply (water quality, components of the system, general understanding of treatment, typical installations, rural water supply).
4. Sanitary sewage (origin and composition of sewage, organic matter and microorganisms in sewage, evaluation and monitoring parameters, pollution and autodepuration of water, components of the system, general understanding of treatment, typical installations, disposal of waste in rural areas).
5. Solid waste management (general conception, origin and composition of municipal solid waste, sweeping, collection, reduction, recycling, treatment, transportation, final disposal).
6. Notions of water, air and soil pollution (legislation, causes and effects, forms of control).

Suggested bibliography

- ❖ ALEM SOBRINHO, P.; TSUTIYA, M. T. *Coleta e transporte de esgoto sanitário*. São Paulo: Escola Politécnica, USP. 547 p. 1999.
- ❖ BARROS, R.T.V.; CHERNICHARO, C.A.L.; HELLER, L.; VON SPERLING, M. (ed) *Manual de saneamento e proteção ambiental para apoio aos municípios* (Volume 2). Belo Horizonte: Departamento de Engenharia Sanitária e Ambiental - DESA-UFMG / Fundação Estadual do Meio Ambiente - FEAM. 1995.
- ❖ HELLER, L.; PÁDUA, V.L. (org.). *Abastecimento de água para consumo humano*. 2ed. 2v. Belo Horizonte: Editora UFMG, 2010. 859p. (Ingenium).
- ❖ IPT: Instituto de Pesquisas Tecnológicas. *Lixo municipal: manual de gerenciamento integrado*. 2000
- ❖ LIBÂNIO, M. *Fundamentos de qualidade e tratamento de água*. 3ed. Campinas: Editora Átomo. 494 p. 2010.
- ❖ VON SPERLING, M. *Princípios do tratamento biológico de águas residuárias*. Vol. 1. Introdução à qualidade das águas

- e ao tratamento de esgotos. Belo Horizonte: Editora UFMG. 472 p. 2014.
- ❖ BARROS, R.T.V. *Elementos de gestão de resíduos sólidos*. Vol 1. 1ed. Belo Horizonte: Editora. Tessitura. 410p. 2012.

II. Area of concentration: ENVIRONMENT

Program

1. Fundamentals of Environmental Technology
 - 1.1. General understanding of ecology; biogeochemical cycles
 - 1.2. Environmental aspects and impacts of anthropogenic activities
 - 1.3. Mass and energy flows and balances
 - 1.4. Ideal chemical reactions and reactors
2. Water Pollution
 - 2.1. Parameters of water quality and liquid effluents
 - 2.2. Control of water pollution
 - 2.2.1. Dispersion of pollutants
 - 2.2.2. Physical, physical-chemical and biological treatments
3. Air pollution
 - 3.1. Air quality and air emission parameters
 - 3.2. Air pollution control
 - 3.2.1. Dispersion of pollutants
 - 3.2.2. Removal of particulate matter and gasses and vapors
4. Soil pollution
 - 4.1. Characterization and use of soil
 - 4.2. Solid residues
 - 4.2.1. Characterization
 - 4.2.2. Treatment: reduction of hazard risks and volume
 - 4.2.3. Final disposal
5. Environmental legislation

Suggested bibliography

- ❖ AARNE VESILIND, P. e MORGAN, S. M. *Introdução à Engenharia Ambiental* - Cengage Learning, Tradução da 2ª edição norte-americana. 2011.
- ❖ BAIRD, C.; CANN, Michael. *Química Ambiental* – 4ª Ed., Bookman, 844 p. 2011
- ❖ BRAGA, Benedito et al. *Introdução à Engenharia Ambiental* – 2ª ed., Editora Prentice Hall, 336 p. 2005.
- ❖ CETESB *Resíduos Sólidos Industriais*. 234 p. 1992.
- ❖ DREW, D. *Processos Interativos Homem – Meio Ambiente*. Bertrand Brasil, 206 p. 1998.
- ❖ ECKENFELDER Jr, W.W.; FORD, D. L.; ENGLANDE Jr, A. J. *Industrial Water Quality* – 4ª ed., McGraw-Hill Professional., 956 p. 2009
- ❖ MATOS, A. T. *Poluição Ambiental: Impactos no meio físico*. Ed. UFV. 1a Ed. Viçosa, MG, 2010. 264p.
- ❖ Resoluções e normas CONAMA, COPAM, CERH, ABNT

III. Area of concentration: HYDRAULICS AND WATER RESOURCES

Program

1. Fundamentals of Hydraulics
 - 1.1. Physical properties of fluids
 - 1.2. Hydraulics of forced conduits: pressure drop, tracing of pipes, understanding of lifting installations
 - 1.3. Free flows: flow regimes, uniform flow, gradual and abruptly varied flow
2. Fundamentals of Hydrology
 - 2.1. Hydrological cycle and water balance
 - 2.2. Measurement and characterization of the hydrological variables rainfall and season
 - 2.3. Notions of probability and statistics applied to hydrological studies
 - 2.4. Drought flows and flow regularization
 - 2.5. Flood hydrograph: rational method and unit hydrograph

Suggested bibliography

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